

MILITARY SPECIFICATION
 ATTENUATORS, FIXED
 GENERAL SPECIFICATION FOR

This specification is approved for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers the general requirements for radio and microwave frequency fixed attenuators (see 6.1).

1.2 Classification. Attenuators shall be of the following classes, as specified (see table I and 6.2):

- Class I - For use as the primary standard.
- Class II - For use as a secondary standard, and in laboratory and precision test equipment.
 - A. With lumped-constant or distributed shunt and series elements.
 - B. With lossy-line pads.
- Class III - For use in general field equipment.
- Class IV - For use in equipment in which precision and stability are secondary considerations.

TABLE I. Classification of attenuators.

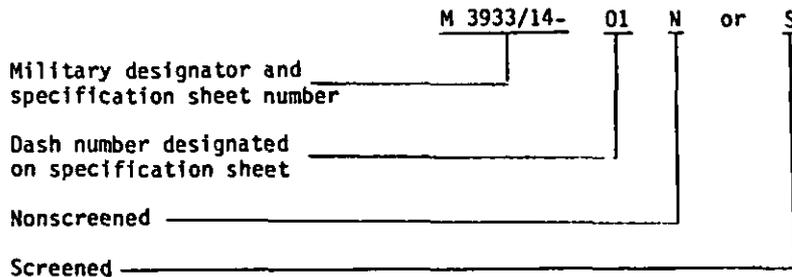
Characteristic	Class I	Class II		Class III	Class IV
		A	B		
VSWR (at either end, max)					
Waveguide to 18 GHz	1.05	1.15		1.35	1.50
Waveguide over 18 GHz	1.15	1.30		1.50	1.75
Others, Fin GHz	1.03*	1.10*		1.30*	1.50*
	0.005F	0.015F		0.02F	0.03F
Deviation of attenuation from that specified at reference frequency (basic test) (see 3.1), max:					
Up to 10 dB, incl	0.02 dB	0.1 dB		0.2 dB	0.5 dB
Over 10 dB	0.002 dB/dB	0.01 dB/dB		0.02 dB/dB	0.05 dB/dB
Change in attenuation after temperature change or thermal shock, max:					
Up to 10 dB, incl	0	0.01 dB		0.05 dB	0.5 dB
Over 10 dB	0	0.001 dB/dB		0.005 dB/dB	0.05 dB/dB
Change in attenuation after vibration or shock, max:					
Up to 10 dB, incl	0	0.05 dB		0.1 dB	0.5 dB
Over 10 dB	0	0.005 dB/dB		0.01 dB/dB	0.05 dB/dB

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commander, Naval Electronic Systems Command, ATTN: ELEX 8111, Department of the Navy, Washington, D. C. 20360 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

TABLE I. Classification of attenuators - Continued.

Characteristic	Class I	Class II		Class III	Class IV
		A	B		
Change in attenuation after moisture resistance, max: Up to 10 dB, incl Over 10 dB	0 0	0.1 dB 0.01 dB/dB		0.2 dB 0.02 dB/dB	0.5 dB 0.05 dB/dB
Change in attenuation after salt spray, max: Up to 10 dB, incl Over 10 dB	0 0	0.1 dB 0.01 dB/dB		0.2 dB 0.02 dB/dB	0.5 dB 0.05 dB/dB
Change in attenuation after peak power, max: Up to 10 dB, incl Over 10 dB	0 0	0.01 dB 0.01 dB/dB		0.05 dB 0.005 dB/dB	0.5 dB 0.05 dB/dB
Frequency sensitivity, max:	0.005 dB/dB/GHZ	0.02 dB/dB/GHZ		0.1 dB/dB/GHZ	0.4 dB/dB/GHZ
Power sensitivity for full input power, max:	0 dB/dB/WATT	0.001 dB/dB/WATT		0.005 dB/dB/WATT	0.005 dB/dB/WATT
Temperature sensitivity of attenuation, max:	10 ⁻⁶ dB/dB/°C	0.0001 dB/dB/°C	0.0007 dB/dB/°C	0.0004 dB/dB/°C	0.0006 dB/dB/°C
Connector repeatability max: variation in attenuation	0.002 dB	0.01 dB		0.02 dB	0.04 dB
Concentricity of coaxial connectors	2 percent of inner diameter of outer conductor or 3 mils, whichever is greater			4 percent or 5 mils.	

1.2.1 Military part numbers. The military part number shall consist of the letter "M" followed by the basic number of the specification sheet, an assigned dash (see 3.1), and the letter N or S; where N indicates a nonscreened item and S indicates a screened item. Part numbers without a N or S shall be considered nonscreened items.



2. APPLICABLE DOCUMENTS

2.1 Government specifications and standards. Unless otherwise specified, the following specifications and standards, of the issue listed in that issue of the Department of Defense Index of Specifications and Standards specified in the solicitation, form a part of this specification to the extent specified herein.

SPECIFICATIONS

FEDERAL

- L-P-378 - Plastic Sheet and Strip, Thin Gauge, Polyolefin.
- MN-P-71 - Pallet, Material Handling, Stringer Construction, 2 Way and 4 Way (Partial).
- QQ-M-44 - Magnesium Alloy Plate and Sheet (AZ31B).
- QQ-S-365 - Silver Plating, Electrodeposited; General Requirements For.
- QQ-C-530 - Copper-Beryllium Alloy Bar, Rod, and Wire (Copper Alloy Numbers 172 and 173).
- QQ-C-533 - Copper-Beryllium Alloy Strip (Copper Alloy Numbers 170 and 172).
- QQ-B-613 - Brass, Leaded and Non-Leaded, Flat Products (Plate, Bar, Sheet, Strip).
- QQ-B-626 - Brass, Leaded and Non-Leaded: Rod, Shapes, Forgings, and Flat Products with Finished Edges (Bar and Strip).
- QQ-S-763 - Steel Bars, Wire, Shapes and Forgings, Corrosion-Resisting.
- QQ-S-781 - Strapping, Steel, and Seals.
- PPP-B-566 - Boxes, Folding, Paperboard.
- PPP-B-601 - Boxes, Wood, Cleated-Plywood.
- PPP-B-621 - Boxes, Wood, Nailed and Lock-Corner.
- PPP-B-636 - Boxes, Shipping, Fiberboard.
- PPP-B-676 - Boxes, Set-up.

MILITARY

- MIL-W-85 - Waveguides, Rigid, Rectangular, General Specification For.
- MIL-P-116 - Preservation-Packaging, Methods of.
- MIL-L-3890 - Lines, Radio Frequency Transmission (Coaxial, Air Dielectric), General Specification For.
- MIL-F-3922 - Flanges, Waveguide, General Purpose, General Specification For.
- MIL-P-19834 - Plate, Identification, Metal Foil, Adhesive Backed.
- MIL-I-23011 - Iron Nickel Alloys For Sealing to Glasses and Ceramics.
- MIL-H-28719 - Header, Hermetically Sealed.
- MIL-C-39012 - Connectors, Coaxial, Radio Frequency, General Specification For.
- MIL-G-45204 - Gold Plating, Electrodeposited.
- MIL-C-55302 - Connectors, Printed Circuit Subassembly and Accessories.

(See supplement 1 for list of associated specification sheets.)

STANDARDS

FEDERAL

- FED-STD-595 - Color (Requirements for Individual Color Chip (3X5 Supplement).

MILITARY

- MIL-STD-129 - Marking for Shipment and Storage.
- MIL-STD-130 - Identification Marking of US Military Property.
- MIL-STD-147 - Palletized Unit Loads on 40" x 48" Pallets.
- MIL-STD-202 - Test Methods for Electronic and Electrical Component Parts.
- MIL-STD-794 - Parts and Equipment, Procedures for Packaging and Packing of.
- MIL-STD-889 - Dissimilar Metals.
- MIL-STD-1276 - Leads for Electronic Component Parts.
- MIL-STD-45662 - Calibration Systems Requirements.

DRAWINGS

DEPARTMENT OF THE NAVY

- REA 49330 - UG-45/U Connector for Use With 7/8 Coaxial Air Dielectric Line.
- REA 49331 - UG-46/U Connector for Use With 7/8 Coaxial Air Dielectric Line.

(Copies of specifications, standards, drawings, and publications required by manufacturers in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting officer.)

2.2 Other publications. The following documents form a part of this specification to the extent specified herein. The issues of the documents which are indicated as DoD adopted shall be the issue listed in the current DoDISS and the supplement thereto, if applicable.

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE-STD-287 - Precision Coaxial Connectors.

(Application for copies should be addressed to the Institute of Electrical and Electronics Engineers Headquarters, 345 East 47 Street, New York, NY 10017).

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM-A582 - Free-Machining Stainless and Heat-Resisting Steel Bars, Hot-Rolled or Cold-Finished.

(Application for copies should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pennsylvania 19103).

(Industry association specifications and standards are generally available for reference from libraries. They are also distributed among technical groups and using Federal agencies.)

2.3 Order of precedence. In the event of a conflict between the text of this specification and the references other than specification sheets cited herein, the text of this specification shall take precedence.

3. REQUIREMENTS

3.1 Specification sheets. The individual item requirements shall be as specified herein and in accordance with the applicable specification sheets. In the event of any conflict between requirements of this specification and the specification sheet, the latter shall govern.

3.2 Qualification. Attenuators furnished under this specification shall be products which are qualified for listing on the applicable qualified products list at the time set for opening of bids (see 4.5 and 6.3).

3.3 Material. The material shall be as specified herein and in the applicable specification sheets. When a definite material is not specified, a material shall be used which will enable the attenuator to meet the performance requirements of this specification. Acceptance or approval of any constituent material shall not be construed as a guaranty of the acceptance of the finished product.

3.3.1 Brass. Brass shall conform to QQ-B-626 or QQ-B-613.

3.3.2 Copper alloy. Copper alloy used in fabrication of waveguide-type attenuators shall conform to the requirements for copper alloy specified in MIL-W-85. Copper alloy used in the fabrication of coaxial-type attenuators shall conform to the material requirements specified in MIL-L-3890.

3.3.3 Copper-beryllium. When specified, copper-beryllium alloy shall conform to QQ-C-530 or QQ-C-533.

3.3.4 Aluminum alloy. Aluminum alloy used in the fabrication of waveguide-type attenuators shall conform to the requirements for aluminum alloy specified in MIL-W-85.

3.3.5 Magnesium alloy. Magnesium alloy shall be composition AZ31B, condition H24, conforming to QQ-M-44. When specified (see 3.1 and 6.2), magnesium attenuators shall be supplied.

3.4 Design and construction. Attenuators shall be of the design, construction, and physical dimensions specified (see 3.1). Attenuators shall be of the lightest practicable weight consistent with the strength required for sturdiness, safety, and reliability.

3.4.1 Operating frequency range. The frequency range shall be as specified.

3.4.2 Nominal impedance. The nominal impedance for attenuators shall be as specified.

3.4.3 Flange. Flanges shall be so designed and manufactured as to provide the mating characteristics of the flange specified in accordance with MIL-F-3922.

3.4.4 Connectors. The connectors shall be as specified (see 3.1). The material and gaging for receptacle connectors shall conform to the requirements of MIL-C-39012 or Drawing REA 49330 or REA 49331, whichever is applicable. When specified (see 3.1), precision connectors shall be in accordance with IEEE-STD-287.

3.4.4.1 Connector metal parts. Unless otherwise specified, the male center contact pins shall be captivated and made of corrosion resisting steel, type 302 or 304 in accordance with QQ-S-763, type 303 in accordance with ASTM A 582 or beryllium copper conforming to QQ-C-530, silver plated in accordance with QQ-S-365 or when specified, gold plated in accordance with MIL-G-45204, type II, class 1. The female center contact pins shall be captivated and made of beryllium copper conforming to QQ-C-530, silver plated in accordance with QQ-S-365 or when specified (see 3.1), gold plated in accordance with MIL-G-45204, type II, class 1.

3.4.4.2 Printed circuit connectors. Printed circuit connectors for a specific attenuator shall conform to MIL-C-55302 as applicable.

3.4.5 Leads. Leads connections for a specific attenuator shall be a chemical composition conforming to MIL-STD-1276 or MIL-I-23011 and shall be solderable unless otherwise specified.

3.4.6 Socket pins. Socket pins for a specific attenuator shall conform to MIL-H-28719 as applicable.

3.4.7 Weight. The weight for attenuators shall be as specified (see 3.1).

3.4.8 External finish. The external finish of attenuators shall be as specified (see 3.1).

3.4.9 Temperature range. The operating and non-operating temperature range shall be as specified (see 3.1).

3.5 Performance.

3.5.1 Screening. All screened attenuators produced to this specification shall be screened in accordance with table IV. After screening, the attenuator shall be subjected to group A inspection.

3.5.2 Coaxial connector wear resistance. When attenuators with coaxial connectors are tested as specified in 4.7.3, there shall be no damage to the connectors that will cause electrical failure. During and after cycling, neither lubrication nor removal of excess material shall be permitted. After this test, attenuators shall meet the requirements of 3.5.3 and 3.5.4.

3.5.3 Voltage standing wave ratio (VSWR) (at either end). When attenuators are tested as specified in 4.7.4, the VSWR at room temperature shall not exceed the value specified.

3.5.4 Attenuation. When attenuators are tested as specified in 4.7.5, the attenuation at room temperature shall be as specified. The deviation from nominal value shall not exceed the applicable value in table I.

3.5.5 Electromagnetic interference (RF leakage) (for Coaxial and Waveguide attenuators). When attenuators are tested as specified in 4.7.6, the RF leakage from the attenuator shall be at least 65 dB below the incoming signal level.

3.5.6 Coaxial connector repeatability. After attenuators are tested as specified in 4.7.7, the variation of attenuation shall not exceed the applicable value in table I.

3.5.7 Solderability (as applicable). When attenuators with solderable connections are tested as specified in 4.7.8, there shall be no evidence of pinholes and blistering.

3.5.8 Terminal strength/lead integrity (as applicable). When attenuators with terminals or leads are tested as specified in 4.7.9, there shall be no evidence of a broken terminal or lead, elongation greater than 1/2 of the thread pitch, or breakage, loosening or relative motion between the terminals and the attenuator body when viewed through a magnification of at least 10X. Any of these shall be considered a failure.

3.5.9 Resistance to solvents. When attenuators are tested as specified in 4.7.10, there shall be no evidence of illegible marking, mechanical damage, or deterioration of material or finishes to the extent that they can be readily identified from a distance of at least six inches with normal room lighting and without the aid of magnification or with a viewer having a magnification no greater than 3X.

3.5.10 Stability of attenuation. When attenuators are tested as specified in 4.7.11, the attenuation change after temperature change, thermal shock, vibration, shock, moisture resistance, salt spray or peak power shall not exceed the applicable value specified in table I. After the salt spray test, there shall be no evidence of corrosion or pitting.

3.5.11 Sensitivity of attenuation. When computed as specified in 4.7.12, the sensitivity of attenuation of attenuators with frequency, with power, and with temperature shall not exceed the applicable value specified in table I.

3.5.12 Life. When attenuators are tested as specified in 4.7.13, the attenuation change shall not exceed the value that was measured for temperature stability under 3.5.4.

3.6 Marking. Attenuators shall be marked in accordance with MIL-STD-130, with the class, military part number, manufacturer's source code or logo, attenuation in dB, frequency range, average power rating, date code, and serialization. When the available marking space is less than 0.15 square inches, the class, attenuation, frequency range, and average power rating may be deleted from the marking. The marking characters shall be at least 1/32 inch high. The marking shall be placed on the attenuator using a method that will provide legible and permanent marking for the life of the attenuator.

3.6.1 Date code. Attenuators shall be marked by a unique code to identify the period during which they were manufactured. The first two numbers in the code shall be two digits of the number of the year, and the third and fourth number shall be two digits indicating the calendar week of the year. When the number of the week is a single digit, it shall be preceded by a zero reading from left to right or from top to bottom, the code number shall designate the year and week, in that order. The date code shall not be altered or removed from the attenuator.

3.6.2 Serialization. Each attenuator shall be marked with a unique serial number assigned consecutively within the inspection lot allowing traceability of the attenuator.

3.7 Workmanship. Attenuators shall be processed in such a manner as to be uniform in quality and shall be free from sharp edges and burrs, except where sharp edges are required for mechanical or electrical reasons.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract, the contractor is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract, the contractor may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.1.1 Test equipment and inspection facilities. Test and measuring equipment and inspection facilities of sufficient accuracy, quality and quantity to permit performance of the required inspection shall be established and maintained by the contractor. The establishment and maintenance of a calibration system to control the accuracy of the measuring and test equipment shall be accordance with MIL-STD-45662.

4.2 Classification of inspections. The inspections specified herein are classified as follows:

- a. Material inspection (see 4.3).
- b. Qualification inspection (see 4.5).
- c. Quality conformance inspection (see 4.6).

4.3 **Materials inspection.** Materials inspection shall consist of certification supported by verifying data that the materials listed in table II, used in fabricating the attenuator, are in accordance with the applicable referenced specifications or requirements prior to such fabrication.

TABLE II. Materials inspection.

Material	Requirement paragraph	Applicable specification
Brass	3.3.1	QQ-B-613, QQ-B-626
Copper alloy	3.3.2	MIL-W-85, MIL-L-3890
Copper-beryllium	3.3.3	QQ-C-530, QQ-C-533
Aluminum alloy	3.3.4	MIL-W-85
Magnesium alloy	3.3.5	QQ-M-44

4.4 **Inspection conditions.** Unless otherwise specified herein, all inspections shall be performed in accordance with the test conditions specified in the "GENERAL REQUIREMENTS" of MIL-STD-202.

4.4.1 **Test method variation.** Variation from the specified test methods use to verify the electrical parameters are allowed provided that it is demonstrated to the preparing activity or their agent that such variations in no way relax the requirements of this specification and that they are approved before testing is performed. For propose test variations, a test method comparative error analysis shall be made available for checking by the preparing activity or their agent.

4.5 **Qualification inspection.** Qualification inspection shall be performed at a laboratory acceptable to the Government (see 6.3) on sample units produced with equipment and procedures normally used in production. Qualification obtained for each group (see appendix) shall constitute qualification for all attenuators with characteristics for that group (see table III).

4.5.1 **Sample size.** Four samples of the same class and part number shall be subjected to qualification inspection.

4.5.2 **Inspection routine.** The sample shall be subjected to the qualification inspection specified in table III, in the order shown. All units shall be subjected to the inspection of group I. The sample shall then be divided into two groups of two units each (see 4.5.1). The sample units shall then be subjected only to the inspections indicated for their particular group.

4.5.3 **Failures.** One or more failures shall be cause for refusal to grant qualification approval. A failure shall be anything that does not meet the requirements of the specification.

TABLE III. Qualification inspection.

Inspection	Requirement paragraph	Test method paragraph
<u>Group I (all samples)</u>		
Screened per table IV (for screened attenuators only)	3.5.1	4.7.2
Visual and mechanical examination 1/	3.1, 3.3, 3.4, 3.6 and 3.7	4.7.1
Coaxial connector wear resistance: 2/	3.5.2	4.7.3
VSMR	3.5.3	4.7.4
Attenuation	3.5.4	4.7.5

TABLE III - Qualification inspection - Continued

Inspection	Requirement paragraph	Test method paragraph
<u>Group II -- 2 Sample Units</u>		
Stability of attenuation	3.5.10	4.7.11
After temperature change		
After thermal shock		
After vibration		
After shock		
After moisture resistance		
After salt spray		
After peak power		
Sensitivity of attenuation	3.5.11	4.7.12
After change in frequency		
After change in input power		
After change in temperature		
Visual and mechanical examination	3.1, 3.3, 3.4, 3.6, and 3.7	4.7.1
<u>Group III -- 2 Sample Units</u>		
Electromagnetic interference/ RF leakage <u>5/</u>	3.5.5	4.7.6
Coaxial connector repeatability: attenuation <u>2/</u>	3.5.6 3.5.4	4.7.7 4.7.5
Solderability: <u>3/</u>	3.5.7	4.7.8
Terminal strength/lead integrity: <u>4/</u>	3.5.8	4.7.9
Resistance to solvents	3.5.9	4.7.10
Life: 760 Hours attenuation	3.5.12 3.5.4	4.7.13 4.7.5
Visual and mechanical examination	3.1, 3.3, 3.4, 3.6 and 3.7	4.7.1

1/ For nonscreened attenuators only.

2/ Coaxial types of attenuator.

3/ Attenuators with solderable leads or terminal.

4/ Attenuators with leads or terminal.

5/ Coaxial and waveguide types of attenuator.

4.5.4 Disposition of qualification sample units. Sample units which have been subjected to qualification testing shall not be delivered on any contract or purchase order. The Government reserves the right to retain the sample units or to require the contractor to furnish the sample units with the qualification inspection report.

4.5.5 Retention of qualification. To retain qualification, the contractor shall forward a report at 24-month intervals to the qualifying activity. The qualifying activity shall establish the initial reporting date. The report shall consist of:

- a. A summary of the results of the tests performed for inspection of product for delivery (group A), indicating as a minimum the number of attenuators that have passed and the number that have failed. The results of the tests of all reworked attenuators shall be identified and accounted for.
- b. A summary of the results of tests performed for periodic inspection (group B), including the number and mode of failures. The summary shall include results of all periodic inspection tests performed and completed during the 24-month period. If the summary of test results indicates nonconformance with specification requirements, and corrective action acceptable to the qualifying activity has not been taken, action may be taken to remove the failing product from the qualified products list.

Failure to submit the report within 60 days after the end of each 24-month period may result in loss of qualification for the product. In addition to the periodic submission of inspection data, the contractor shall immediately notify the qualifying activity at any time during the 24-month period that the inspection data indicates failure of the qualified product to meet the requirements of this specification.

In the event that no production occurred during the reporting period, a report shall be submitted certifying that the company still has the capabilities and facilities necessary to produce the attenuators. If during the two consecutive reporting periods there has been no production, the manufacturers may be required, at the discretion of the qualifying activity, to submit his qualified products to testing in accordance with the qualification inspection requirements and the reason for no production.

4.6 Quality conformance inspection.

4.6.1 General. Quality conformance inspection shall consist of group A inspection, screening (when applicable), and group B inspections. Group B inspection shall be performed under periodic inspection.

4.6.1.1 Inspection lot. An inspection lot shall consist of all attenuators with the same part number produced under essentially the same conditions, and offered for inspection at one time.

4.6.1.2 Screening. Screening shall consist of the examination and tests specified in table IV in the order shown. Attenuators shall pass screening, before being subjected to group A inspection.

4.6.1.3 Group A inspection. Group A inspection shall consist of the examination and tests specified in table V, in the order shown.

4.6.1.4 Hundred-percent inspection. All screened attenuators shall be subjected to screening and group A inspection. All nonscreened attenuators shall be subjected to group A inspection. Defective units shall be individually rejected.

4.6.1.5 Rejected items. If an inspection item is rejected, the contractor may rework it to correct the defect and resubmit for reinspection. Such items shall be separate from new-items and shall be clearly identified as reinspected items.

4.6.1.6 Test data. Data shall be taken and recorded for all tests performed on individual item and sent to the procuring agency. The manner of performing measurements and data sheets shall be included and shipped in the same container as the attenuator. No classified information shall appear on the data sheet.

TABLE IV. Screening.

Inspection	Requirement paragraph	Test method paragraph
Thermal shock	3.5.1	4.7.2.1
Conditioning	3.5.1	4.7.2.2
Visual and mechanical examination	3.5.1	4.7.2.3
Pre-burn-in electrical:		
DC resistance <u>1/</u>	3.5.1	4.7.2.4
VSWR	3.5.1	
Attenuation	3.5.1	
Burn-in 240 Hours	3.5.1	4.7.2.5
Post-burn-in electrical:		
DC resistance <u>1/</u>	3.5.1	4.7.2.6
VSWR	3.5.1	
Attenuation	3.5.1	
Radiographic inspection	3.5.1	4.7.2.7

1/ Not applicable for waveguide attenuators.

TABLE V. Group A inspection.

Inspection	Requirement paragraph	Test method paragraph
Visual and mechanical examination	3.1, 3.3, 3.4, 3.6, and 3.7	4.7.1
VSWR	3.5.3	4.7.4
Attenuation	3.5.4	4.7.5
Stability of attenuation: After peak power	3.5.10	4.7.11

4.6.2 Periodic inspection. Periodic inspection shall consist of group B inspection. Except where the results of these inspections show noncompliance with the applicable requirements (see 4.6.2.5), delivery of products which have passed the screening and group A inspections (screened items only) or group A inspection (nonscreened items only) shall not be delayed pending the results of these periodic inspections.

4.6.2.1 Group B inspection. Group B inspection shall consist of the inspections, specified in table VI, in the order shown. The sample shall be divided into two groups of two units each. The units shall then be subjected only to the inspections indicated for their particular group. Group B inspection shall be made on sample units selected from inspection lots which have passed the group A inspection.

4.6.2.2 Sampling plan. Four sample units (see 4.5.2) shall be selected every 24 months. The first inspection shall be 24-months after the date of notification of qualification.

4.6.2.3 Failures. If one or more sample units fail to pass group B inspection, the sample shall be considered to have failed.

4.6.2.4 Disposition of sample units. Sample units which have been subjected to group B inspection shall not be delivered on contract.

4.6.2.5 Noncompliance. If a sample fails to pass group B inspection, the manufacturer shall notify the qualifying activity and cognizant inspection activity of such failure and take corrective action on the material or processes, or both, as warranted, and on all units of product which can be corrected and which were manufactured under essentially the same conditions, with essentially the same materials and processes, and which are considered subject to the same failure. Acceptance and shipment of the product shall be discontinued until corrective action, acceptable to the Government, has been taken. After the corrective action has been taken, group B inspection shall be repeated on additional sample units (all inspections, or the inspection which the original sample failed) at the option of the qualifying activity. Group A inspection may be reinstated; however, final acceptance shall be withheld until the group B inspection has shown that corrective action was successful. In the event of failure after inspection, information concerning the failure and the corrective action taken shall be furnished to the cognizant inspection activity and the qualifying activity.

TABLE VI. Group B inspection.

Inspection	Requirement paragraph	Test method paragraph
<u>Group I -- 2 Sample Units</u>		
Stability of attenuation	3.5.10	4.7.11
After temperature change		
After thermal shock		
After vibration		
After shock		
After moisture resistance		
After salt spray		
After peak power		
Sensitivity of attenuation	3.5.11	4.7.12
After change in frequency		
After change in input power		
After change in temperature		
Visual and mechanical examination	3.1, 3.3, 3.4, 3.6, and 3.7	4.7.1
<u>Group II -- 2 Sample Units</u>		
Coaxial connector wear resistance: <u>1/</u>	3.5.2	4.7.3
VSWR	3.5.3	4.7.4
attenuation	3.5.4	4.7.5
Coaxial connector repeatability: <u>1/</u>	3.5.6	4.7.7
attenuation	3.5.4	
Solderability <u>2/</u>	3.5.7	4.7.8

TABLE VI. Group B inspection - Continued.

Inspection	Requirement paragraph	Test method paragraph
<u>Group II -- 2 Sample Units (Cont'd)</u>		
Terminal strength/lead integrity:	3.5.8	4.7.9
Resistance to solvents <u>4/</u>	3.5.9	4.7.10
Electromagnetic interference/RF leakage	3.5.5	4.7.6
Life: 760 Hours attenuation	3.5.12 3.5.4	4.7.13 4.7.5
Visual and mechanical examination	3.1, 3.3, 3.4, 3.6 and 3.7	4.7.1

1/ Coaxial types of attenuators.

2/ Attenuators with solderable leads or terminals.

3/ Attenuators with leads or terminals.

4/ Coaxial and waveguide types of attenuators.

4.6.3 Inspection of packaging. The sampling and inspection of the preservation and interior pack marking shall be in accordance with the group A and B quality conformance inspection requirements of MIL-P-116. The sampling and inspection of the packing and marking for shipment and storage shall be in accordance with the quality assurance provisions of the applicable container specification and the marking requirements of MIL-STD-129.

4.7 Methods of examination and test.

4.7.1 Visual and mechanical examination (see 3.1, 3.3, 3.4, 3.6 and 3.7). Attenuators shall be examined to verify that the design, construction, physical dimensions, marking and workmanship are in accordance with the applicable requirements.

4.7.2 Screening (see 3.5.1). Attenuators shall be screened as specified in 4.7.2.1 through 4.7.2.7.

4.7.2.1 Thermal shock. With the connections uncovered, attenuators shall be tested in accordance with method 107 of MIL-STD-202. The following details and exceptions shall apply:

- a. Mounting - When applicable attenuators may be mounted on a heat sink.
- b. Test condition - B, except the temperature extremes shall be those specified (see 3.1) and the number of cycles shall be ten (10). Place attenuators in the cold chamber for one-half (1/2) hour. Attenuators should be so positioned that they are exposed to freely circulating chamber air. Remove attenuators from the cold chamber and place in the hot chamber for one-half (1/2) hour. Transfer shall take place within five (5) minutes of removal from the cold chamber, one cycle consist of room temperature to cold, to room temperature to hot, and back to room temperature.

4.7.2.2 Conditioning. Attenuators shall be conditioned as specified in 4.7.2.2.1 or 4.7.2.2.2.

4.7.2.2.1 Lossy attenuator element conditioning. Subject attenuators to a temperature of $100^{\circ}\text{C} \pm 5^{\circ}\text{C}$ for a period of 48 (+12, -0) hours.

4.7.2.2.2 Resistive film attenuator conditioning. Each end (input or output) of the attenuator shall be subjected to a direct current power level equal to the average power specified (see 3.1) at a temperature of $+75^{\circ}\text{C} \pm 5^{\circ}\text{C}$ for a period of 48 ± 3 hours (for a total of 96 hours). (Direct current power level is equal to the applied voltage times current). During the conditioning test, the attenuator shall be terminated in a 50-ohm resistive load.

4.7.2.3 Visual and mechanical examination. Visual and mechanical examination of attenuators shall be as specified in 4.7.1.

4.7.2.4 Pre-burn-in electrical. Before the burn-in is performed, the parameters listed in table IV as Preburn-in shall be measured at 25 (+0, -2)°C and the data recorded for all attenuators. Method of measurements shall be as specified in 4.7.2.4.1 through 4.7.2.4.3.

4.7.2.4.1 DC resistance. The DC resistance center conductor to center conductor and center conductor to case or ground (as applicable) for each side shall be measured using equipment capable of measuring one hundredth of an ohm.

4.7.2.4.2 VSWR. The VSWR shall be measured as specified in 4.7.4 at a low power level.

4.7.2.4.3 Attenuation. The attenuation (insertion loss) between ends shall be measured as specified in 4.7.5, with the exception that the signal source frequency shall be 100 Hertz (Hz).

4.7.2.5 Burn-in. Attenuators shall be burn-in for 120 hours for each end (for a total of 240 hours) under the following conditions:

- a. Temperature = 75°C ±5° C
- b. Load = 50 or 72 ±2 ohms (for coaxial and stripline attenuators)
= Nominal load (for waveguide attenuators)
- c. DC power input = 0.5 Watt, + 50 mW, -0 mW into one end for 120 hours; apply this same power to the other end for the next 120 hours.

4.7.2.6 Post burn-in electrical. After the burn-in, the same parameters specified in 4.7.2.4 shall be remeasured and the parametric change (delta) shall be determined. Attenuators that exceeds one or more of the following delta limits shall be considered to have failed.

- a. DC resistance -- ±2%
- b. VSWR -- ±0.1
- c. Attenuation -- ±0.2 dB

4.7.2.7 Radiographic. Attenuators shall be examined in accordance with method 209 of MIL-STD-202, the following details shall apply:

- a. A three-dimensional image quality indicator, constructed of, and containing materials which are compatible with the attenuators being X-rayed, shall be available for simultaneous exposure with the attenuator. The image quality indicator shall utilize slots, wires, and particles of sizes down to and including major dimensions equal to or less than 0.001 inch.
- b. Two views shall be required, at 90° to each other, and both perpendicular to the major (long) axis of the attenuator.
- c. The radiographs shall be examined under variable lighting conditions and magnification of 1X to 7X for the defects specified in paragraph 4 of MIL-STD-202, method 209.
- d. The attenuators that have been X-rayed and found acceptable shall be identified with a blue dot. The blue dot shall be approximately 1/16 inch in diameter. The color selected from FED-STD-595 shall be any shade between 15102-15123 or 25102-25109. The dot shall be placed so that it is readily visible but shall not obliterate other attenuator markings.
- e. Serialization of attenuators is required and must be correlatable to the film views. One film copy is required to be shipped with the attenuators. The manufacturer is not required to retain film copies. One copy of a report is required for each lot shipped indicating the number of attenuators radiographically inspected, the number found acceptable and the number rejected.

4.7.3 Connector wear resistance (see 3.5.2). The connectors shall be subjected to 500 cycles of connection and disconnection. A cycle shall consist of a firm connection made to both connectors of the attenuator with the coupling means tightened to normal tightness and the connector then completely disconnected and removed from the circuit.

4.7.4 VSWR (at either end) (see 3.5.3). The VSWR of attenuators shall be measured at each end and at the specified frequency (see 3.1).

4.7.4.1 Procedure. VSWR of attenuators shall be measured using a system such as shown on figure 1. Tuners and pads shall be used, when necessary, to reduce residual VSWR of the system to a level that will assure accurate results before connecting the assembly under test. The overall accuracy of VSWR measurements shall be such that the absolute VSWR = (measured VSWR) + 0.08 (maximum specified VSWR).

4.7.5 Attenuation (see 3.5.4). The attenuation of attenuators shall be measured using the applicable test setup specified in table VII or equivalent, with the accuracy therein specified at the frequency specified (see 3.1).

4.7.6 Electromagnetic interference (when specified) (see 3.1) (RF leakage) (see 3.5.5). The swept frequency measurement shall be made covering the total frequency range in steps not exceeding an octave band (the appropriate stub antenna should be tuned to a quarter wave at midoctave).

- a. Place a fixed amount of RF power in a transmission line in series with a variable attenuator and spectrum analyzer.
- b. Place specified value of attenuation (see 3.1) in the line and note the difference in readings on the spectrum analyzer.
- c. Reset the attenuator to zero and place a $\lambda/4$ stub (at midband) at one end of the flexible coaxial cable and connected to the spectrum analyzer.
- d. Place the test attenuator in a transmission line properly terminated and "SNIFF" the part with the $\lambda/4$ stub. The $\lambda/4$ stub should come as close to the part as possible without touching. Particular attention shall be given to connectors, fastening devices and flange interfaces.
- e. Any attenuation in excess of the value specified in 4.7.6b shall be cause for rejecting the part.

4.7.7 Connector repeatability (see 3.5.6). Attenuators shall be tested for connector repeatability using a system as shown on figure 2. The following details shall apply:

- a. Test at specified test frequencies or at three frequencies, one from each third of the rated frequency range.
- b. Perform 10 complete connects and disconnects, both ends separately.
- c. Rotate attenuator through full 360° with each mating at approximately 36° increments.
- d. Cleaning of connectors or reshaping of contacts is not permitted during test sequence.
- e. Side thrust shall not be permitted during test.

4.7.8 Solderability (see 3.5.7). The terminals of the attenuator shall be tested in accordance with method 208 of MIL-STD-202.

4.7.9 Terminal strength/lead integrity (see 3.5.8). Attenuators shall be tested as specified in 4.7.9.1 or 4.7.9.2.

4.7.9.1 Terminal strength. Attenuators with terminals shall be tested in accordance with method 211 of MIL-STD-202, test condition A, applied force 1.5 pounds.

4.7.9.2 Lead integrity. Attenuators with leads shall be tested in accordance with method 211 of MIL-STD-202, tested condition C. The applied force shall be 8 ± 0.5 ounces. For leads with a section modulus equal to or less than that of a lead with a cross-section of 0.006×0.20 , the force shall be $3 \pm .3$ ounces.

4.7.10 Resistance to solvents (see 3.5.9). Attenuators shall be tested in accordance with method 215 of MIL-STD-202. All portions of the attenuator shall be brushed.

4.7.11 Stability of attenuation (see 3.5.10). Attenuators shall be subjected to the tests as specified in 4.7.11.1 to 4.7.11.7 inclusive. At the conclusion of each of these tests, the attenuators shall be examined for evidence of mechanical damage.

4.7.11.1 With temperature change. The change in attenuation with temperature change shall be determined by measuring the attenuation of the attenuators (see 4.7.5 and figure 8) at 23°C ±2°C with a maximum power input of 10 milliwatts (mW), and at both extremes of the operating temperature range specified (see 3.1). Source and load impedance as seen from the junction of both thermal isolators shall be reflectionless. When the dB is greater the 0.1 dB from reference to the extreme operating temperature, figure 8 is a recommended test setup; however, for smaller change, figures 3 and 8, should be combined.

4.7.11.2 After thermal shock. Attenuators shall be tested in accordance with method 107 of MIL-STD-202. The following details shall apply:

- a. Test condition - B, -65° C to +100° C
- b. Measurements before and after thermal shock - Attenuation shall be measured (see 4.7.5 and figure 9), at the inspection conditions specified in 4.4, with minimum input power and at full-rated input power (see 3.1).

4.7.11.3 After vibration. Attenuators shall be tested in accordance with method 204 of MIL-STD-202. The following details and exceptions shall apply:

- a. Test condition - D (unless otherwise specified (see 3.1)).
- b. Method of mounting - Attenuators shall be attached to the vibration table by clamps. Unless otherwise specified, a clamp shall be placed around the center of each attenuator, and no part of the attenuator shall touch any object other than the clamp.
- c. Duration of vibration - 1 hour in each of three mutually perpendicular directions (total of 3 hours).
- d. Measurements after vibration - Attenuation shall be measured as specified in 4.7.5.

4.7.11.4 After shock. Attenuators shall be tested in accordance with method 213 of MIL-STD-202. The following details shall apply:

- a. Test condition - I (unless otherwise specified (see 3.1)).
- b. Measurement after shock - Attenuation shall be measured as specified in 4.7.5.

4.7.11.5 After moisture resistance. Attenuators shall be tested in accordance with method 106 of MIL-STD-202. The following details and exceptions shall apply:

- a. Initial measurements - Not applicable.
- b. Polarization and load - Not applicable.
- c. Subcycle step 7b - Not applicable.
- d. Final measurement - Attenuation shall be measured as specified in 4.7.5.

4.7.11.6 After salt spray. Attenuators shall be tested in accordance with method 101 of MIL-STD-202. The following details shall apply:

- a. Special detail - During the test, connectors shall be mated to capped dummy connectors.
- b. Test condition - B.
- c. Examinations after exposure - Attenuators shall be examined for evidence of corrosion or pitting.
- d. Measurements after salt spray - Attenuation shall be measured as specified in 4.7.5 after the attenuator has been cleaned of any salt accumulation.

4.7.11.7 After peak power. Attenuators shall be supported in still air and free space at the standard inspection conditions specified in 4.4. The specified peak power shall be applied for 1 hour at each end (see 3.1). After the attenuator has cooled to standard inspection conditions (see 4.4), attenuation shall be measured as specified in 4.7.5.

4.7.12 Sensitivity of attenuation (see 3.5.11). Sensitivity of attenuation of attenuators shall be determined by measuring attenuation as specified in 4.7.5 at each extreme of the frequency range (see 3.1), at full input power (see 3.1) and any reference power, and at each extreme of the temperature range (see 3.1). Sensitivity of attenuation shall be computed in accordance with the following formulas:

$$\begin{aligned} \text{Frequency sensitivity} &= \frac{\Delta \text{dB}}{\text{dB}} \frac{1}{\Delta f} \\ \text{Power sensitivity} &= \frac{\Delta \text{dB}}{\text{dB}} \frac{1}{\Delta P} \\ \text{Temperature sensitivity} &= \frac{\Delta \text{dB}}{\text{dB}} \frac{1}{\Delta t} \\ &= \frac{\Delta \text{dB}}{\Delta t} \text{ for class II A over 20 dB} \end{aligned}$$

Where:

ΔdB = Change in attenuation at either extreme of the operating frequency, at full input power, or at either extreme of the operating temperature (see 3.1).

dB = Attenuation at reference frequency, reference power, or reference temperature.

Δf = Change in frequency from reference to extreme, in GHz.

ΔP = Change in power from reference to full input, in watts.

Δt = Change in temperature from reference to extreme, in °C.

4.7.13 Life. Attenuators shall be tested in the same manner as specified in 4.7.2.5, and 4.7.2.6, except the time shall be 380 hours for each end (for a total of 760 hours).

5. PACKAGING

5.1 Preservation. Preservation shall be level A or C, as specified (see 6.2).

5.1.1 Level A.

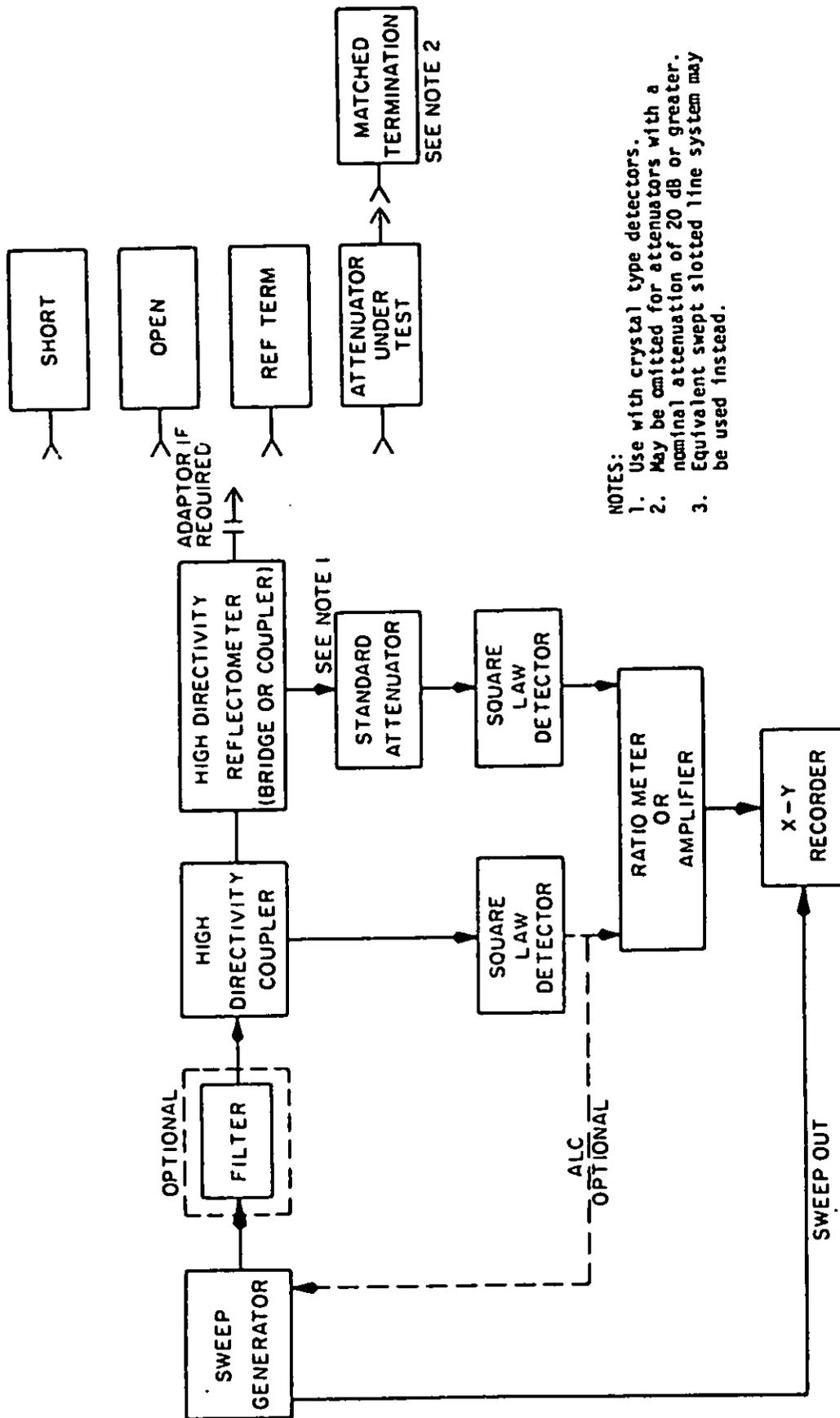
5.1.1.1 Cleaning. Attenuators shall be cleaned in accordance with MIL-P-116, process C-1.

5.1.1.2 Drying. Attenuators shall be dried in accordance with MIL-P-116.

5.1.1.3 Preservative application. Preservatives shall not be used.

5.1.1.4 Unit packs. Each attenuator shall be individually unit packed one each in accordance with submethod IX-B of MIL-P-116 insuring compliance with the applicable requirements of that specification. Each attenuator exceeding four inches in overall length shall be placed within a supplementary container conforming to PPP-B-566, PPP-B-676 or PPP-B-636.

5.1.1.5 Intermediate packs. Those attenuators, unit packed as specified in 5.1.1.4 and not requiring supplementary containers, shall be placed in intermediate containers conforming to PPP-B-566 or PPP-B-676. Intermediate containers shall be uniform in size, shape and quantities, shall be of minimum tare and cube and shall contain multiples of five unit packs, not to exceed 100 unit packs. No intermediate packs are required when the total quantity shipped to a single destination is less than 100 unit packs.



- NOTES:
1. Use with crystal type detectors.
 2. May be omitted for attenuators with a nominal attenuation of 20 dB or greater.
 3. Equivalent swept slotted line system may be used instead.

FIGURE 1. VSWR test setup.

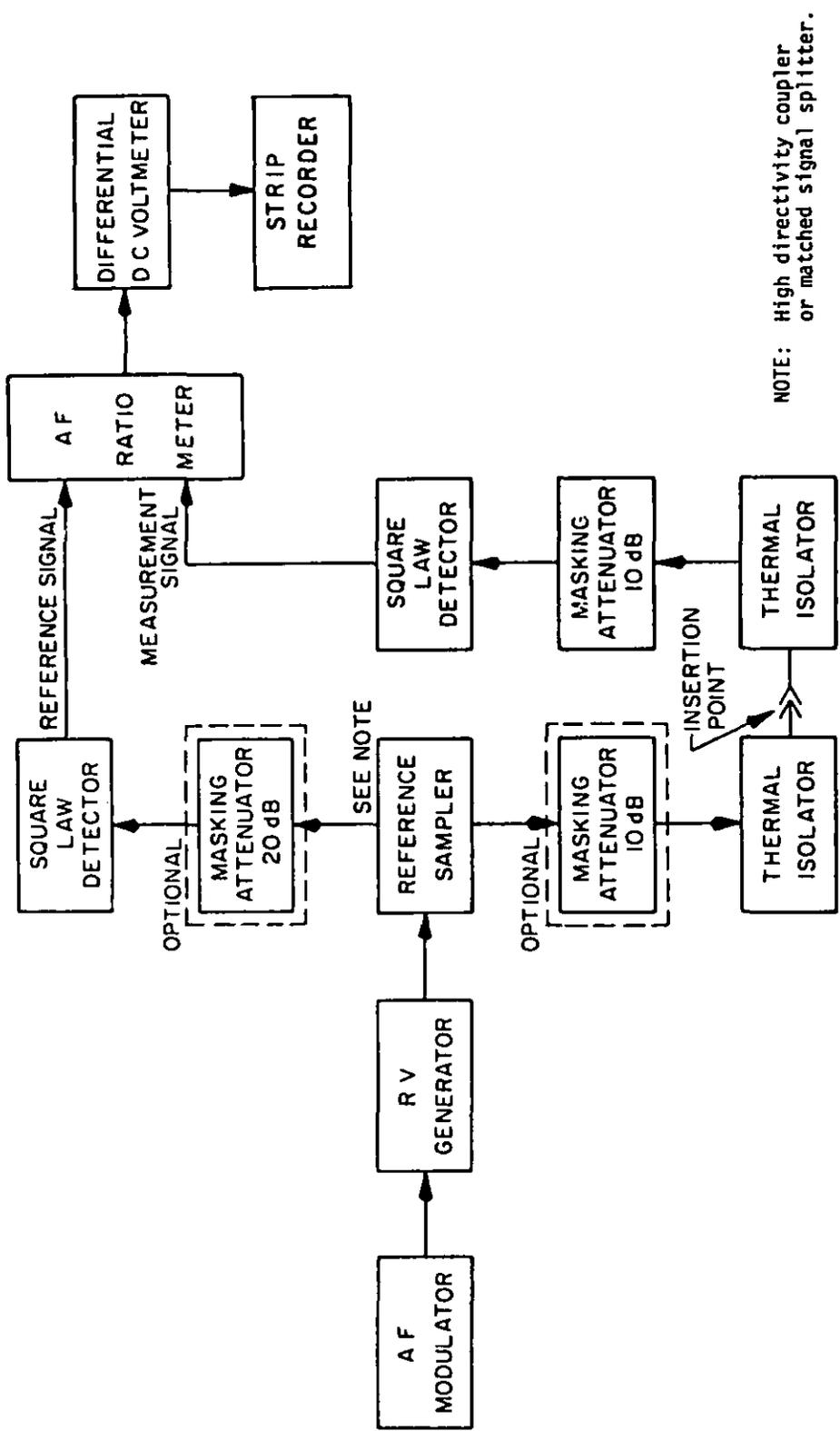
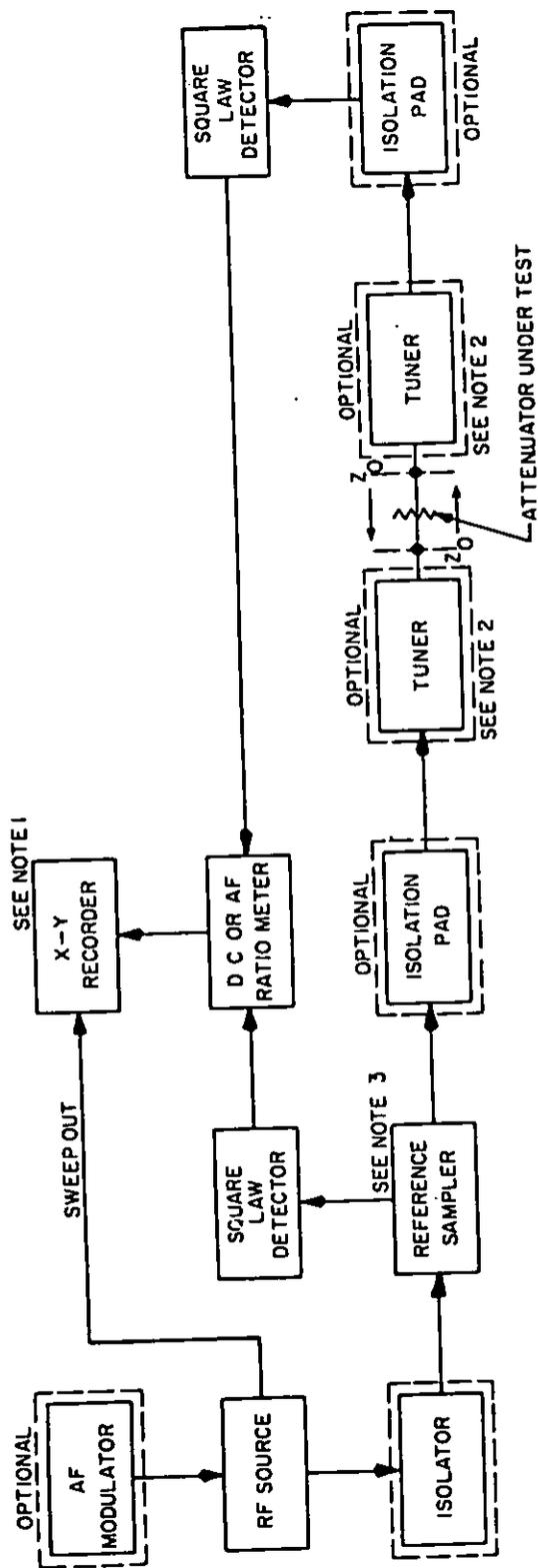


FIGURE 2. Test setup for connector repeatability.

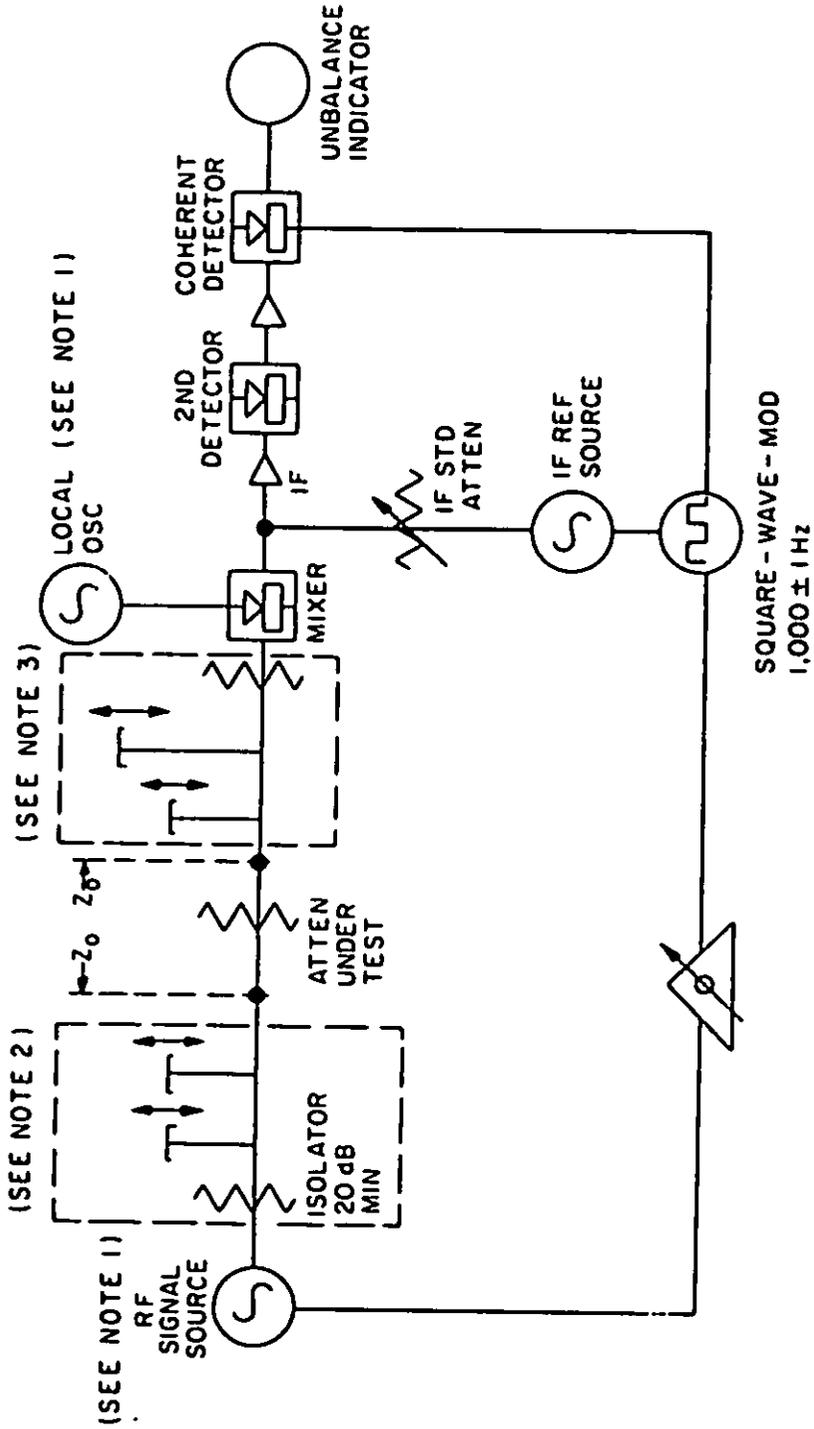
TABLE VII. Test setups for attenuation measurements.

Attenuator class	Attenuation value, dB	Test setup		Accuracy of attenuation measurements
		Method	Figure	
I	Up to 20, incl	Dual-channel audio substitution	3	Up to 5 dB, incl - - 0.01 dB Over 5 to 10 dB, incl - 0.02 dB Over 10 to 20 dB, incl - 0.02 dB/10 dB
	Over 20 to 100, incl	Parallel IF substitution	4	Over 20 to 30 dB, incl - 0.06 dB Over 30 to 100 dB, incl - 0.02 dB/10 dB
II	Up to 30, incl	Single-channel audio substitution	5	Up to 10 dB, incl - - 0.05 dB Over 10 to 30 dB, incl - 0.1 dB
	Over 30 to 50, incl	As above, using calibrated 20 dB radio frequency attenuator for partial RF substitution and RF source supplying 20 mW peak power (10 mW, average)		Over 30 to 50 dB, incl - 0.02 dB
III	Up to 50, incl	RF substitution (Accuracy of the RF standard attenuator shall be not less than 0.1 dB/10 dB; stability of the RF source and stability and sensitivity of the detector at the lowest level shall each be at least 10 times better than system accuracy)	6	Up to 10 dB, incl - - - 0.2 dB Over 10 to 50 dB, incl - 0.2 dB/10 dB
IV	Up to 50, incl	Signal generator (Accuracy of the signal-generator output attenuator shall be not less than 0.3 dB/10 dB; stability of the RF source and stability and sensitivity of the detector at lowest level shall be at least five times better than system accuracy)	7	Up to 10 dB, incl - - - 0.5 dB Over 10 to 50 dB, incl - 0.5 dB/10 dB



- NOTES:
1. For swept frequency measurement.
 2. Omit for swept frequency measurements.
 3. High directivity coupler or matched signal splitter.

FIGURE 3. Test setup for attenuation measurements for class I attenuators up to 20 dB included at fixed frequency and class II attenuators up to 30 dB included over a swept frequency range.



NOTES:

1. For measurements between 20 and 100 dB use balanced mixer. RF signal source and local oscillator must be separately phase locked. Leakage of RF source into meter must be at least 60 dB lower than minimum level for attenuator under test.
2. Or equivalent power splitter or directional coupler.
3. Or equivalent directional coupler.

FIGURE 4. Test setup for attenuation measurements for class I attenuators over 20 dB to 100 dB, incl., by parallel intermediate frequency substitution method.

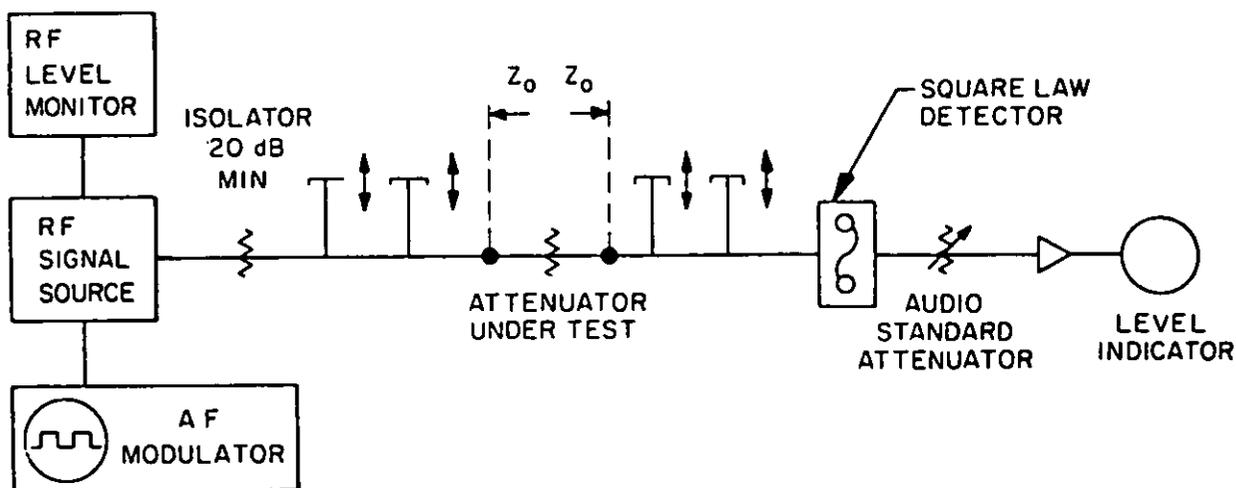


FIGURE 5. Test setup for attenuation measurements for class II attenuators up to 30 dB, incl., by single-channel audio-substitution method.

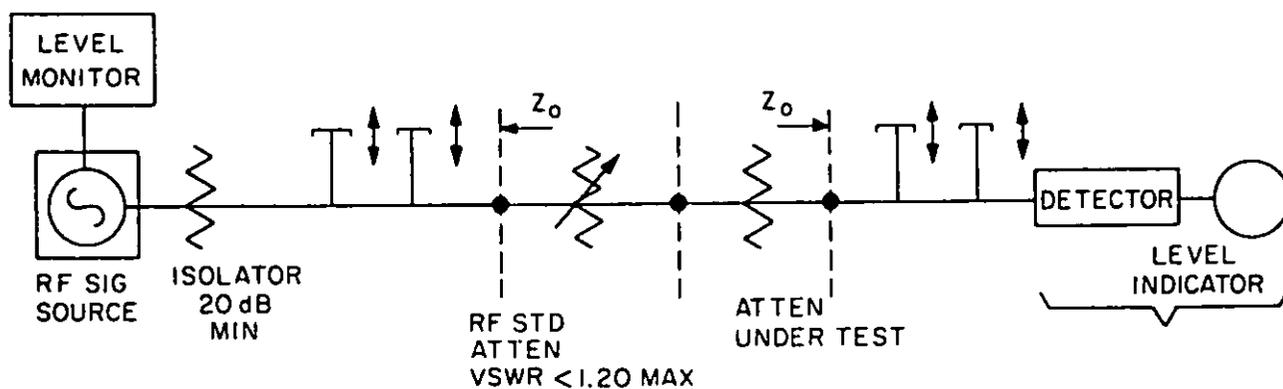


FIGURE 6. Test setup for attenuation measurements for class III attenuators up to 50 dB, incl., by RF-substitution method.

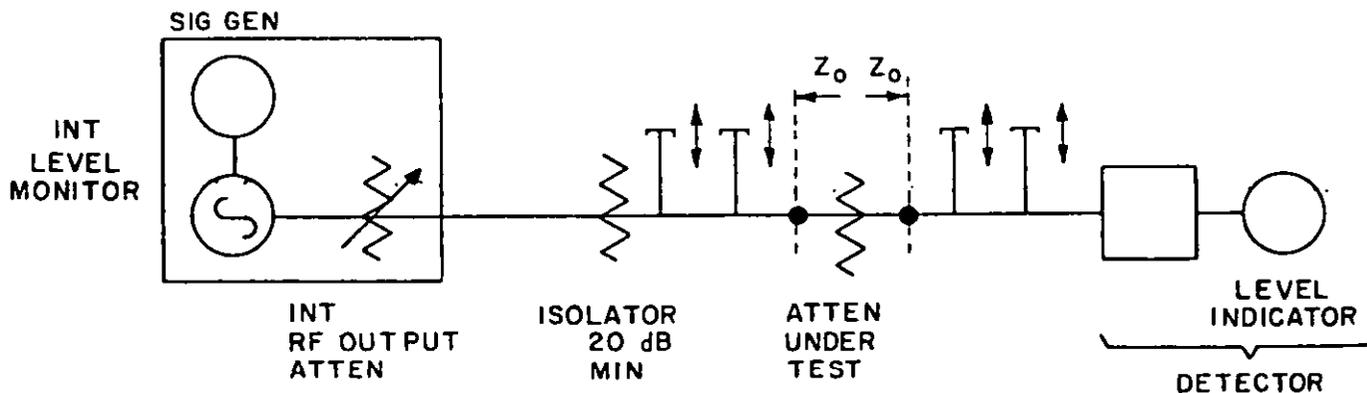
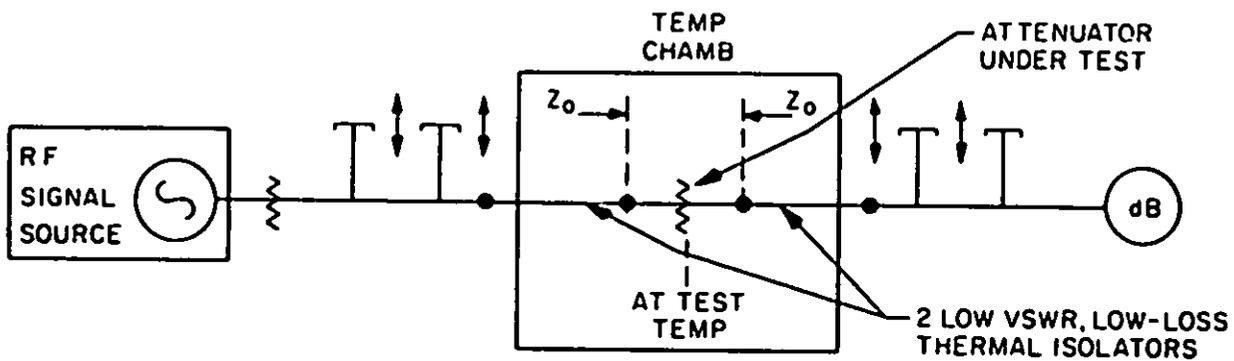


FIGURE 7. Test setup for attenuation measurements for class IV attenuators up to 50 dB, incl., by signal-generator method.



STEP 1. REFERENCE READING FOR ZERO SET.
 STEP 2. INSERT ATTENUATOR UNDER TEST
 BETWEEN BOTH THERMAL ISOLATORS.

FIGURE 8. Modification of test setup for attenuation measurement at extreme temperature.

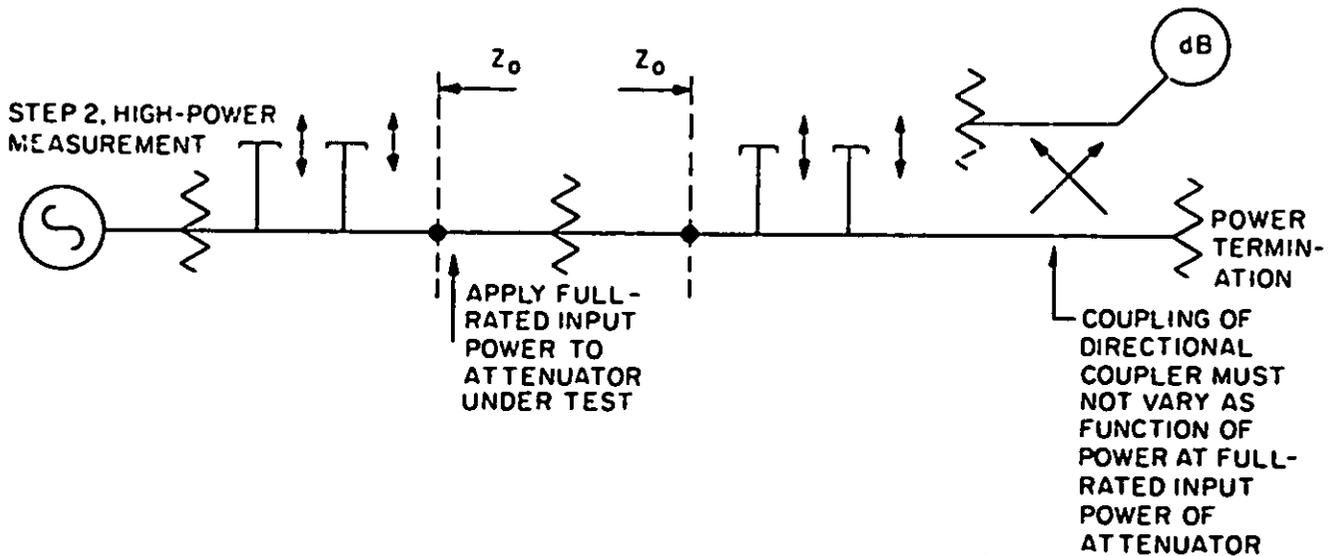
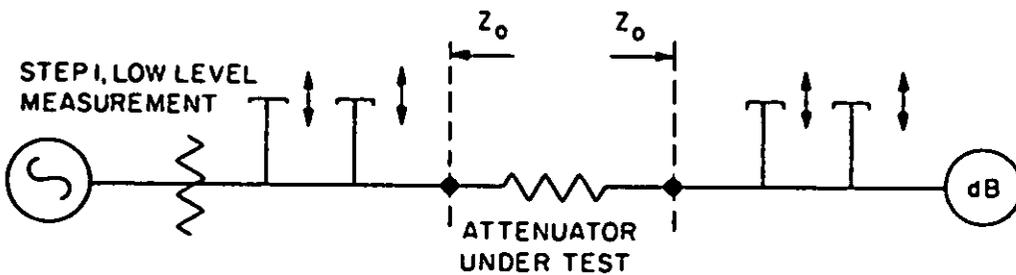


FIGURE 9. Modification of test setup for attenuation measurement at high power.

5.1.2 Level B. The level B preservation for attenuators shall be as specified for level A except that submethod IC-1 or IC-3 of MIL-P-116 shall be used in lieu of submethod IA-8.

5.1.3 Level C. The level C preservation for attenuators shall conform to the MIL-STD-794 requirements for this level.

5.2 Packing. Packing shall be level A, B or C, as specified (see 6.2).

5.2.1 Level A. Attenuators, preserved as specified in 5.1, shall be packed in wood boxes conforming to PPP-B-601, overseas type or PPP-B-621, class 2. Closure and strapping shall be in accordance with the applicable container specification except that metal strapping shall conform to QQ-S-781, type I, finish A. The requirements for level B packing shall be used when the total quantity of a stock numbered attenuator for a single destination does not exceed a packed volume of one cubic foot.

5.2.2 Level B. Attenuators, preserved as specified in 5.1, shall be packed in fiberboard containers conforming to PPP-B-636, class weather resistant, style optional, special requirements. The requirements for box closure, waterproofing and reinforcing shall be in accordance with method V of the PPP-B-636 appendix.

5.2.3 Level C. Attenuators, preserved as specified in 5.1, shall be packed in fiberboard containers conforming to PPP-B-636, class domestic, style optional, special requirements. Closures shall be in accordance with the appendix thereto.

5.2.4 Unitized loads. Unitized loads, commensurate with the level of packing specified in the contract or order, shall be used whenever total quantities for shipment to one destination equal 40 cubic feet or more. Quantities less than 40 cubic feet need not be unitized. Unitized loads shall be uniform in size and quantities to the greatest extent practicable.

5.2.4.1 Level A. Attenuators, packed as specified in 5.2.1, shall be unitized on pallets in conformance with the MIL-STD-147, load type I, with a wood cap (storage aid 5) positioned over each load.

5.2.4.2 Level B. Attenuators, packed as specified in 5.2.2, shall be unitized as specified in 5.2.4.1 except that weather resistant fiberboard caps (storage aid 4) shall be used in lieu of wood caps.

5.2.4.3 Level C. Attenuators, packed as specified in 5.2.3, shall be unitized as specified in 5.2.4.2 except that the fiberboard caps shall be class domestic.

5.3 Marking. In addition to any special or other identification marking required by the contract (see 6.2), each unit supplementary and exterior container and unitized load shall be marked in accordance with MIL-STD-129. The complete military or contractor's type or part number, as applicable (including the FSCM), shall be marked on all unit and supplementary packs in accordance with the identification marking provisions of MIL-STD-129.

5.4 General.

5.4.1 Exterior containers. Exterior containers (see 5.2.1, 5.2.2 and 5.2.3) shall be of a minimum tare and cube consistent with the protection required and shall contain equal quantities of identical stock numbered items to the greatest extent practicable.

5.4.2 Packaging inspection. The inspection of these packaging requirements shall be in accordance with 4.6.3.

5.4.3 Army acquisitions.

5.4.3.1 Level A and B unit and intermediate packs. In addition to that specified in 5.1.1.4 and 5.1.1.5, unit and intermediate containers shall either be weather or water resistant (e.g., variety 2 of PPP-B-566 or PPP-B-676) or overwrapped with waterproof barrier materials. Intermediate containers shall not exceed 50 unit packs. Intermediate containers shall not be required when the total quantity to be shipped will result in only one intermediate pack per shipping container.

5.4.3.2 Level A and B packing. When the gross weight exceeds 200 pounds or the container length and width is 48 x 24 inches or more and the weight exceeds 100 pounds, 3 x 4 inch skids (laid flat) shall be applied in accordance with the requirements of the container specification. Unitization shall be required when the containers specified in 5.2.1 and 5.2.2 do not require skids; quantities per destination exceed either a total of 250 pounds (excluding the pallet) or a volume of 20 cubic feet; and the container size permits use of one of the pallet patterns of MIL-STD-147. A quantity of containers, packed as specified, except that container strapping may be omitted, shall be placed on a pallet, load type I conforming to MIL-STD-147. For level B, unit containers which meet these requirements may be palletized without further packing. The pallet shall conform to NN-P-71, type IV, group I or II woods. The load shall be "bonded" to the pallet by strapping conforming to QQ-S-781, type I, finish A, or shrink film conforming to L-P-378, type IV. Stretch wrap in accordance with MIL-STD-147 is authorized for shipments within the continental United States and for containerized shipments.

6. NOTES

6.1 Intended use. Attenuators covered by this specification are intended for use in the radio and microwave frequency region.

6.1.1 Packaging intended use. The preservation, packing and marking specified herein are intended for direct shipments to the Government. However, this specification may also be used for the preparation of attenuators for shipment from the parts contractor to the original equipment manufacturer.

6.2 Ordering data. Procurement documents should specify:

6.2.1 For attenuators covered by specification sheets (see 3.1). Procurement documents should specify the following:

- a. Title, number, and date of this specification.
- b. Title, number, and date of the applicable specification sheet, and attenuator class (see 1.2.1 and 3.1).
- c. Levels of preservation and packing required (see 5.1 and 5.2).
- d. If special or additional identification marking is required (see 5.3).
- e. Magnesium alloy, only when specified (see 3.1).
- f. Part number.

6.3 Qualification. With respect to products requiring qualification, awards will be made only for products which are at the time set for opening of bids, qualified for inclusion in applicable qualified products list whether or not such products have actually been so listed by that date. The attention of the contractors is called to this requirement, and manufacturers are urged to arrange to have the products that they propose to offer to the Federal Government tested for qualification in order that they may be eligible to be awarded contracts for the products covered by this specification. The activity responsible for the qualified products list is the Naval Electronic Systems Command, ELEX 8111, Department of the Navy, Washington, DC 20363; however, information pertaining to qualification of products may be obtained from the Defense Electronics Supply Center (DESC-E), Dayton, OH 45444.

6.3.1 Copies of "Provisions Governing Qualification" SD-6 may be obtained upon application to Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, PA 19120.

6.4 Conditions for use of level B preservation. When level B preservation is specified (see 5.1.2), this degree of protection should be used for the acquisition of attenuators for resupply worldwide under known favorable handling, transportation and storage conditions.

6.5 Changes from previous issue. Asterisks are not used in this revision to identify changes with respect to the previous issue, due to the extensiveness of the changes.

Custodians:

Army - ER
Navy - EC
Air Force - 85

Preparing activity:
Navy - EC

Review activities:

Army - MI
Air Force - 11, 17, 99
DLA - ES

(Project 5985-0983)

User activities:

Navy - AS, MC, SH
Army - AR

Agent:

DLA - ES

APPENDIX

Group Qualification

10. SCOPE

10.1 Scope. This appendix provides manufacturers a grouping that can be used to obtain qualification for a number of items by qualifying one item in a group. The grouping shall be in accordance with the following table. Manufacturers may qualify at a lower frequency range than listed in the characteristics of qualifying attenuator column of the table. This will qualify attenuators with the state characteristics in a group from this frequency range down to the lowest frequency range specified. Attenuators having requirement for a higher average power rating than the qualifying attenuator may be qualified providing they pass the higher power requirement. This appendix is a mandatory part of the specification. The information contained herein is intended for compliance.

TABLE VIII. Grouping for qualification.

Group number	Characteristics of qualifying attenuators	Characteristics of attenuators qualified
1	Waveguide Class I (see table 1) Screened Frequency range 18-26.5 GHz Low average power Attenuation 20 dB	Waveguide Classes I, IIA and B, III and IV Screened or nonscreened Frequency range 18-26.5 GHz to 2.60 - 3.95 GHz Low to high average power Attenuation 20 to 0 dB
2	Waveguide Class I Nonscreened Frequency range 18-26.5 GHz Low average power Attenuation 20 dB	Waveguide Classes I, IIA and B, III and IV Nonscreened Frequency ranges 18-26.5 GHz to 2.60 - 3.95 GHz Low to high average power Attenuation 20 to 0 dB
3	Waveguide Class IIA Screened Frequency range 18-26.5 GHz Low average power Attenuation 20 dB	Waveguide Classes IIA and B, III and IV Screened or nonscreened Frequency range 18-26.5 GHz to 2.60 - 3.95 GHz Low to high average power Attenuation 20 to 0 dB
4	Waveguide Class IIA Nonscreened Frequency range 18-26.5 GHz Low average power Attenuation 20 dB	Waveguide Classes IIA and B, III and IV Nonscreened Frequency range 18-26.5 GHz to 2.60 - 3.95 GHz Low to high average power Attenuation 20 to 0 dB
5	Waveguide Class III Screened Frequency range 18-26.5 GHz Low average power Attenuation 20 dB	Waveguide Classes III and IV Screened or nonscreened Frequency range 18-26.5 GHz to 2.60 - 3.95 GHz Low to high average power Attenuation 20 to 0 dB

APPENDIX

TABLE VIII. Grouping for qualification - Continued.

Group number	Characteristics of qualifying attenuators	Characteristics of attenuators qualified
6	Waveguide Class III Nonscreened Frequency range 18-26.5 GHz Low average power Attenuation 20 dB	Waveguide Classes III and IV Nonscreened Frequency range 18-26.5 GHz to 2.60 - 3.95 GHz Low to high average power Attenuation 20 to 0 dB
7	Waveguide Class IV Screened Frequency range 18-26.5 GHz Low average power Attenuation 20 dB	Waveguide Class IV Screened or nonscreened Frequency range 18-26.5 GHz to 2.60 - 3.95 GHz Low to high average power Attenuation 20 to 0 dB
8	Waveguide Class IV Nonscreened Frequency range 18-26.5 GHz Low average power Attenuation 20 dB	Waveguide Class IV Nonscreened Frequency range 18-26.5 GHz to 2.60 - 3.95 GHz Low to high average power Attenuation 20 to 0 dB
9	Waveguide Class I Screened Frequency range 18-26.5 GHz Low average power Attenuation 40 dB	Waveguide Classes I, IIA and B, III and IV Screened or nonscreened Frequency range 18-26.5 GHz to 2.60 - 3.95 GHz Low to high average power Attenuation 40 to 21 dB
10	Waveguide Class I Nonscreened Frequency range 18-26.5 GHz Low average power Attenuation 40 dB	Waveguide Classes I, IIA and B, III and IV Nonscreened Frequency range 18-26.5 GHz to 2.60 - 3.95 GHz Low to high average power Attenuation 40 to 21 dB
11	Waveguide Class IIA Screened Frequency range 18-26.5 GHz Low average power Attenuation 40 dB	Waveguide Class IIA and B, III and IV Screened or nonscreened Frequency range 18-26.5 GHz to 2.60 - 3.95 GHz Low to high average power Attenuation 40 to 21 dB

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TABLE VIII. Grouping for qualification - Continued.

Group number	Characteristics of qualifying attenuators	Characteristics of attenuators qualified
12	Waveguide Class IIA Nonscreened Frequency range 18-26.5 GHz Low average power Attenuation 40 dB	Waveguide Classes IIA and B, III and IV Nonscreened Frequency range 18-26.5 GHz to 2.60 - 3.95 GHz Low to high average power Attenuation 40 to 21 dB
13	Waveguide Class III Screened Frequency range 18-26.5 GHz Low average power Attenuation 40 dB	Waveguide Classes III and IV Screened or nonscreened Frequency range 18-26.5 GHz to 2.60 - 3.95 GHz Low to high average power Attenuation 40 to 21 dB
14	Waveguide Class III Nonscreened Frequency range 18-26.5 GHz Low average power Attenuation 40 dB	Waveguide Classes III and IV Nonscreened Frequency range 18-26.5 GHz to 2.60 - 3.95 GHz Low to high average power Attenuation 40 to 21 dB
15	Waveguide Class IV Screened Frequency range 18-26.5 GHz Low average power Attenuation 40 dB	Waveguide Class IV Screened or nonscreened Frequency range 18-26.5 GHz to 2.60 - 3.95 GHz Low to high average power Attenuation 40 to 21 dB
16	Waveguide Class IV Nonscreened Frequency range 18-26.5 GHz Low average power Attenuation 40 dB	Waveguide Class IV Nonscreened Frequency range 18-26.5 GHz to 2.60 - 3.95 GHz Low to high average power Attenuation 40 to 21 dB
17	Waveguide Class I Screened Frequency range 18-26.5 GHz Low average power Attenuation 60 dB	Waveguide Classes I, IIA and B, III and IV Screened or nonscreened Frequency range 18-26.5 GHz to 2.60 - 3.95 GHz Low to high average power Attenuation 60 to 41 dB

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TABLE VIII. Grouping for qualification - Continued.

Group number	Characteristics of qualifying attenuators	Characteristics of attenuators qualified
18	Waveguide Class I Nonscreened Frequency range 18-26.5 GHz Low average power Attenuation 60 dB	Waveguide Classes I, IIA and B, III and IV Nonscreened Frequency range 18-26.5 GHz to 2.60 - 3.95 GHz Low to high average power Attenuation 60 to 41 dB
19	Waveguide Class IIA Screened Frequency range 18-26.5 GHz Low average power Attenuation 60 dB	Waveguide Classes IIA and B, III and IV Screened or nonscreened Frequency range 18-26.5 GHz to 2.60 - 3.95 GHz Low to high average power Attenuation 60 to 41 dB
20	Waveguide Class IIA Nonscreened Frequency range 18-26.5 GHz Low average power Attenuation 60 dB	Waveguide Classes IIA and B, III and IV Nonscreened Frequency range 18-26.5 GHz to 2.60 - 3.95 GHz Low to high average power Attenuation 60 to 41 dB
21	Waveguide Class III Screened Frequency range 18-26.5 GHz Low average power Attenuation 60 dB	Waveguide Classes III and IV Screened or nonscreened Frequency range 18-26.5 GHz to 2.60 - 3.95 GHz Low to high average power Attenuation 60 to 41 dB
22	Waveguide Class III Nonscreened Frequency range 18-26.5 GHz Low average power Attenuation 60 dB	Waveguide Classes III and IV Nonscreened Frequency range 18-26.5 GHz to 2.60 - 3.95 GHz Low to high average power Attenuation 60 to 41 dB
23	Waveguide Class IV Screened Frequency range 18-26.5 GHz Low average power Attenuation 60 dB	Waveguide Class IV Screened or nonscreened Frequency range 18-26.5 GHz to 2.60 - 3.95 GHz Low to high average power Attenuation 60 to 41 dB

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TABLE VIII. Grouping for qualification - Continued.

Group number	Characteristics of qualifying attenuators	Characteristics of attenuators qualified
24	Waveguide Class IV Nonscreened Frequency range 18-26.5 GHz Low average power Attenuation 60 dB	Waveguide Class IV Nonscreened Frequency range 18-26.5 GHz to 2.60 - 3.95 GHz Low to high average power Attenuation 60 to 41 dB
25	Waveguide Class I Screened Frequency range 220-325 GHz Low average power Attenuation 20 dB	Waveguide Classes I, IIA and B, III and IV Screened or nonscreened Frequency range 220-325 GHz to 22-33 GHz Low to medium average power Attenuation 20 to 0 dB
26	Waveguide Class I Nonscreened Frequency range 220-325 GHz Low average power Attenuation 20 dB	Waveguide Classes I, IIA and B, III and IV Nonscreened Frequency range 220-325 GHz to 22-33 GHz Low to medium average power Attenuation 20 to 0 dB
27	Waveguide Class IIA Screened Frequency range 220-325 GHz Low average power Attenuation 20 dB	Waveguide Classes IIA and B, III and IV Screened or nonscreened Frequency range 220-325 GHz to 22-33 GHz Low to medium average power Attenuation 20 to 0 dB
28	Waveguide Class IIA Nonscreened Frequency range 220-325 GHz Low average power Attenuation 20 dB	Waveguide Classes IIA and B, III and IV Nonscreened Frequency range 220-325 GHz to 22-33 GHz Low to medium average power Attenuation 20 to 0 dB
29	Waveguide Class III Screened Frequency range 220-325 GHz Low average power Attenuation 20 dB	Waveguide Classes III and IV Screened or nonscreened Frequency range 220-325 GHz to 22-33 GHz Low to medium average power Attenuation 20 to 0 dB

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TABLE VIII. Grouping for qualification - Continued.

Group number	Characteristics of qualifying attenuators	Characteristics of attenuators qualified
30	Waveguide Class III Nonscreened Frequency range 220-325 GHz Low average power Attenuation 20 dB	Waveguide Classes III and IV Nonscreened Frequency range 220-325 GHz to 22-33 GHz Low to medium average power Attenuation 20 to 0 dB
31	Waveguide Class IV Screened Frequency range 220-325 GHz Low average power Attenuation 20 dB	Waveguide Class IV Screened or nonscreened Frequency range 220-325 GHz to 22-33 GHz Low to medium average power Attenuation 20 to 0 dB
32	Waveguide Class IV Nonscreened Frequency range 220-325 GHz Low average power Attenuation 20 dB	Waveguide Class IV Nonscreened Frequency range 220-325 GHz to 22-33 GHz Low to medium average power Attenuation 20 to 0 dB
33	Waveguide Class I Screened Frequency range 220-325 GHz Low average power Attenuation 40 dB	Waveguide Classes I, IIA and B, III and IV Screened or nonscreened Frequency range 220-325 GHz to 22-33 GHz Low to medium average power Attenuation 40 to 21 dB
34	Waveguide Class I Nonscreened Frequency range 220-325 GHz Low average power Attenuation 40 dB	Waveguide Classes I, IIA and B, III and IV Nonscreened Frequency range 220-325 GHz to 22-33 GHz Low to medium average power Attenuation 40 to 21 dB
35	Waveguide Class IIA Screened Frequency range 220-325 GHz Low average power Attenuation 40 dB	Waveguide Classes IIA and B, III and IV Screened or nonscreened Frequency range 220-325 GHz to 22-33 GHz Low to medium average power Attenuation 40 to 21 dB

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TABLE VIII. Grouping for qualification - Continued.

Group number	Characteristics of qualifying attenuators	Characteristics of attenuators qualified
36	Waveguide Class IIA Nonscreened Frequency range 220-325 GHz Low average power Attenuation 40 dB	Waveguide Classes IIA and B, III and IV Nonscreened Frequency range 220-325 GHz to 22-33 GHz Low to medium average power Attenuation 40 to 21 dB
37	Waveguide Class III Screened Frequency range 220-325 GHz Low average power Attenuation 40 dB	Waveguide Classes III and IV Screened or nonscreened Frequency range 220-325 GHz to 22-33 GHz Low to medium average power Attenuation 40 to 21 dB
38	Waveguide Class III Nonscreened Frequency range 220-325 GHz Low average power Attenuation 40 dB	Waveguide Classes III and IV Nonscreened Frequency range 220-325 GHz to 22-33 GHz Low to medium average power Attenuation 40 to 21 dB
39	Waveguide Class IV Screened Frequency range 220-325 GHz Low average power Attenuation 40 dB	Waveguide Class IV Screened or nonscreened Frequency range 220-325 GHz to 22-33 GHz Low to medium average power Attenuation 40 to 21 dB
40	Waveguide Class IV Nonscreened Frequency range 220-325 GHz Low average power Attenuation 40 dB	Waveguide Class IV Nonscreened Frequency range 220-325 GHz to 22-33 GHz Low to medium average power Attenuation 40 to 21 dB
41	Waveguide Class I Screened Frequency range 220-325 GHz Low average power Attenuation 60 dB	Waveguide Classes I, IIA and B, III and IV Screened or nonscreened Frequency range 220-325 GHz to 22-33 GHz Low to medium average power Attenuation 60 to 41 dB

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TABLE VIII. Grouping for qualification - Continued.

Group number	Characteristics of qualifying attenuators	Characteristics of attenuators qualified
42	Waveguide Class I Nonscreened Frequency range 220-325 GHz Low average power Attenuation 60 dB	Waveguide Classes I, IIA and B, III and IV Nonscreened Frequency range 220-325 GHz to 22-33 GHz Low to medium average power Attenuation 60 to 41 dB
43	Waveguide Class IIA Screened Frequency range 220-325 GHz Low average power Attenuation 60 dB	Waveguide Classes IIA and B, III and IV Screened or nonscreened Frequency range 220-325 GHz to 22-33 GHz Low to medium average power Attenuation 60 to 41 dB
44	Waveguide Class IIA Nonscreened Frequency range 220-325 GHz Low average power Attenuation 60 dB	Waveguide Classes IIA and B, III and IV Nonscreened Frequency range 220-325 GHz to 22-33 GHz Low to medium average power Attenuation 60 to 41 dB
45	Waveguide Class III Screened Frequency range 220-325 GHz Low average power Attenuation 60 dB	Waveguide Classes III and IV Screened or nonscreened Frequency range 220-325 GHz to 22-33 GHz Low to medium average power Attenuation 60 to 41 dB
46	Waveguide Class III Nonscreened Frequency range 220-325 GHz Low average power Attenuation 60 dB	Waveguide Classes III and IV Nonscreened Frequency range 220-325 GHz to 22-33 GHz Low to medium average power Attenuation 60 to 41 dB
47	Waveguide Class IV Screened Frequency range 220-325 GHz Low average power Attenuation 60 dB	Waveguide Classes IV Screened or nonscreened Frequency range 220-325 GHz to 22-33 GHz Low to medium average power Attenuation 60 to 41 dB

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TABLE VIII. Grouping for qualification - Continued.

Group number	Characteristics of qualifying attenuators	Characteristics of attenuators qualified
48	Waveguide Class IV Nonscreened Frequency range 220-325 GHz Low average power Attenuation 60 dB	Waveguide Class IV Nonscreened Frequency range 220-325 GHz to 22-33 GHz Low to average power Attenuation 60 to 41 dB
49	Coaxial Class I Screened Frequency range DC-46 GHz Low average power Attenuation 20 dB	Coaxial Classes I, IIA and B, III and IV Screened or nonscreened Frequency range (GHz) DC-46, DC-26.5, DC-18, DC-12, DC-8 and DC-2 Low average power Attenuation 20 to 0 dB
50	Coaxial Class I Nonscreened Frequency range DC-46 GHz Low average power Attenuation 20 dB	Coaxial Classes I, IIA and B, III and IV Nonscreened Frequency range (GHz) DC-46, DC-26.5, DC-18, DC-12, DC-8 and DC-2 Low average power Attenuation 20 to 0 dB
51	Coaxial Class I Screened Frequency range DC-46 GHz Medium average power Attenuation 20 dB	Coaxial Classes I, IIA and B, III and IV Screened or nonscreened Frequency range (GHz) DC-46, DC-26.5, DC-18, DC-12, DC-8 and DC-2 Medium average power Attenuation 20 to 0 dB
52	Coaxial Class I Nonscreened Frequency range DC-46 GHz Medium average power Attenuation 20 dB	Coaxial Classes I, IIA and B, III and IV Nonscreened Frequency range (GHz) DC-46, DC-26.5, DC-18, DC-12, DC-8 and DC-2 Medium average power Attenuation 20 to 0 dB
53	Coaxial Class I Screened Frequency range DC-46 GHz High average power Attenuation 20 dB	Coaxial Classes I, IIA and B, III and IV Screened or nonscreened Frequency range (GHz) DC-46, DC-26.5, DC-18, DC-12, DC-8 and DC-2 High average power Attenuation 20 to 0 dB

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TABLE VIII. Grouping for qualification - Continued.

Group number	Characteristics of qualifying attenuators	Characteristics of attenuators qualified
54	Coaxial Class I Nonscreened Frequency range DC-46 GHz High average power Attenuation 20 dB	Coaxial Classes I, IIA and B, III and IV Nonscreened Frequency range (GHz) DC-46, DC-26.5, DC-18, DC-12, DC-8 and DC-2 High average power Attenuation 20 to 0 dB
55	Coaxial Class IIA Nonscreened Frequency range DC-46 GHz Low average power Attenuation 20 dB	Coaxial Classes IIA and B, III and IV Nonscreened Frequency range (GHz) DC-46, DC-26.5, DC-18, DC-12, DC-8 and DC-2 Low average power Attenuation 20 to 0 dB
56	Coaxial Class IIA Nonscreened Frequency range DC-46 GHz Low average power Attenuation 20 dB	Coaxial Classes IIA and B, III and IV Nonscreened Frequency range (GHz) DC-46, DC-26.5, DC-18, DC-12, DC-8 and DC-2 Low average power Attenuation 20 to 0 dB
57	Coaxial Class IIA Screened Frequency range DC-46 GHz Medium average power Attenuation 20 dB	Coaxial Classes IIA and B, III and IV Screened or nonscreened Frequency range (GHz) DC-46, DC-26.5, DC-18, DC-12, DC-8 and DC-2 Medium average power Attenuation 20 to 0 dB
58	Coaxial Class IIA Nonscreened Frequency range DC-46 GHz Medium average power Attenuation 20 dB	Coaxial Classes IIA and B, III and IV Nonscreened Frequency range (GHz) DC-46, DC-26.5, DC-18, DC-12, DC-8 and DC-2 Medium average power Attenuation 20 to 0 dB
59	Coaxial Class IIA Screened Frequency range DC-46 GHz High average power Attenuation 20 dB	Coaxial Classes IIA and B, III and IV Screened or nonscreened Frequency range (GHz) DC-46, DC-26.5, DC-18, DC-12, DC-8 and DC-2 High average power Attenuation 20 to 0 dB

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TABLE VIII. Grouping for qualification - Continued.

Group number	Characteristics of qualifying attenuators	Characteristics of attenuators qualified
60	Coaxial Class IIA Nonscreened Frequency range DC-46 GHz High average power Attenuation 20 dB	Coaxial Classes IIA and B, III and IV Nonscreened Frequency range (GHz) DC-46, DC-26.5, DC-18, DC-12, DC-8 and DC-2 High average power Attenuation 20 to 0 dB
61	Coaxial Class III Screened Frequency range DC-46 GHz Low average power Attenuation 20 dB	Coaxial Classes III and IV Screened or nonscreened Frequency range (GHz) DC-46, DC-26.5, DC-18, DC-12, DC-8 and DC-2 Low average power Attenuation 20 to 0 dB
62	Coaxial Class III Nonscreened Frequency range DC-46 GHz Low average power Attenuation 20 dB	Coaxial Classes III and IV Nonscreened Frequency range (GHz) DC-46, DC-26.5, DC-18, DC-12, DC-8 and DC-2 Low average power Attenuation 20 to 0 dB
63	Coaxial Class III Screened Frequency range DC-46 GHz Medium average power Attenuation 20 dB	Coaxial Classes III and IV Screened or nonscreened Frequency range (GHz) DC-46, DC-26.5, DC-18, DC-12, DC-8 and DC-2 Medium average power Attenuation 20 to 0 dB
64	Coaxial Class III Nonscreened Frequency range DC-46 GHz Medium average power Attenuation 20 dB	Coaxial Classes III and IV Nonscreened Frequency range (GHz) DC-46, DC-26.5, DC-18, DC-12, DC-8 and DC-2 Medium average power Attenuation 20 to 0 dB
65	Coaxial Class III Screened Frequency range DC-46 GHz High average power Attenuation 20 dB	Coaxial Classes III and IV Screened or nonscreened Frequency range (GHz) DC-46, DC-26.5, DC-18, DC-12, DC-8 and DC-2 High average power Attenuation 20 to 0 dB

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TABLE VIII. Grouping for qualification - Continued.

Group number	Characteristics of qualifying attenuators	Characteristics of attenuators qualified
66	Coaxial Class III Nonscreened Frequency range DC-46 GHz High average power Attenuation 20 dB	Coaxial Classes III and IV Nonscreened Frequency range (GHz) DC-46, DC-26.5, DC-18, DC-12, DC-8 and DC-2 High average power Attenuation 20 to 0 dB
67	Coaxial Class IV Screened Frequency range DC-46 GHz Low average power Attenuation 20 dB	Coaxial Class IV Screened or nonscreened Frequency range (GHz) DC-46, DC-26.5, DC-18, DC-12, DC-8 and DC-2 Low average power Attenuation 20 to 0 dB
68	Coaxial Class IV Nonscreened Frequency range DC-46 GHz Low average power Attenuation 20 dB	Coaxial Class IV Nonscreened Frequency range (GHz) DC-46, DC-26.5, DC-18, DC-12, DC-8 and DC-2 Low average power Attenuation 20 to 0 dB
69	Coaxial Class IV Screened Frequency range DC-46 GHz Medium average power Attenuation 20 dB	Coaxial Class IV Screened or nonscreened Frequency range (GHz) DC-46, DC-26.5, DC-18, DC-12, DC-8 and DC-2 Medium average power Attenuation 20 to 0 dB
70	Coaxial Class IV Nonscreened Frequency range DC-46 GHz Medium average power Attenuation 20 dB	Coaxial Class IV Nonscreened Frequency range (GHz) DC-46, DC-26.5, DC-18, DC-12, DC-8 and DC-2 Medium average power Attenuation 20 to 0 dB
71	Coaxial Class IV Screened Frequency range DC-46 GHz High average power Attenuation 20 dB	Coaxial Class IV Screened or nonscreened Frequency range (GHz) DC-46, DC-26.5, DC-18, DC-12, DC-8 and DC-2 High average power Attenuation 20 to 0 dB

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TABLE VIII. Grouping for qualification - Continued.

Group number	Characteristics of qualifying attenuators	Characteristics of attenuators qualified
72	Coaxial Class IV Nonscreened Frequency range DC-46 GHz High average power Attenuation 20 dB	Coaxial Class IV Nonscreened Frequency range (GHz) DC-46, DC-26.5, DC-18, DC-12, DC-8 and DC-2 High average power Attenuation 20 to 0 dB
73 thru 78	Same as for groups 49 through 54 respectively with the following exception: Frequency range DC-26.5 GHz	Frequency range (GHz) DC-26.5, DC-18, DC-12, DC-8, and DC-2
79 thru 84	Same as for groups 55 through 60 respectively with the following exception: Frequency range DC-26.5 GHz	Frequency range (GHz) DC-26.5, DC-18, DC-12, DC-8 and DC-2
85 thru 90	Same as for groups 61 through 66 respectively with the following exception: Frequency range DC-26.5 GHz	Frequency range (GHz) DC-26.5, DC-18, DC-12, DC-8 and DC-2
91 thru 96	Same as for groups 67 through 72 respectively with the following exception: Frequency range DC-26.5 GHz	Frequency range (GHz) DC-26.5, DC-18, DC-12, DC-8 and DC-2
97 thru 102	Same as for groups 49 through 54 respectively with the following exception: Frequency range DC-18 GHz	Frequency range (GHz) DC-18, DC-12, DC-8 and DC-2
103 thru 108	Same as for groups 55 through 60 respectively with the following exception: Frequency range DC-18 GHz	Frequency range (GHz) DC-18, DC-12, DC-8 and DC-2
109 thru 114	Same as for groups 61 through 66 respectively with the following exception: Frequency range DC-18 GHz	Frequency range (GHz) DC-18, DC-12, DC-8 and DC-2

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TABLE VIII. Grouping for qualification - Continued.

Group number	Characteristics of qualifying attenuators	Characteristics of attenuators qualified
115 thru 120	Same as for groups 67 through 72 respectively with the following exception: Frequency range DC-18 GHz	Frequency range (GHz) DC-18, DC-12, DC-8 and DC-2
121 thru 126	Same as for groups 49 through 54 respectively with the following exception: Frequency range DC-12 GHz	Frequency range (GHz) DC-12, DC-8 and DC-2
127 thru 132	Same as for groups 55 through 60 respectively with the following exception: Frequency range DC-12 GHz	Frequency range (GHz) DC-12, DC-8 and DC-2
133 thru 138	Same as for groups 61 through 66 respectively with the following exception: Frequency range DC-12 GHz	Frequency range (GHz) DC-12, DC-8 and DC-2
139 thru 144	Same as for groups 67 through 72 respectively with the following exception: Frequency range DC-12 GHz	Frequency range (GHz) DC-12, DC-8 and DC-2
145	Coaxial Class I Screened Frequency range DC-46 GHz Low average power Attenuation 40 dB	Coaxial Classes I, IIA and B, III and IV Screened or nonscreened Frequency range (GHz) DC-46, DC-26.5, DC-18, DC-12, DC-8 and DC-2 Low average power Attenuation 40 to 21 dB
146	Coaxial Class I Nonscreened Frequency range DC-46 GHz Low average power Attenuation 40 dB	Coaxial Classes I, IIA and B, III and IV Nonscreened Frequency range (GHz) DC-46, DC-26.5, DC-18, DC-12, DC-8 and DC-2 Low average power Attenuation 40 to 21 dB

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TABLE VIII. Grouping for qualification - Continued.

Group number	Characteristics of qualifying attenuators	Characteristics of attenuators qualified
147	Coaxial Class I Screened Frequency range DC-46 GHz Medium average power Attenuation 40 dB	Coaxial Classes I, IIA and B, III and IV Screened or nonscreened Frequency range (GHz) DC-46, DC-26.5, DC-18, DC-12, DC-8 and DC-2 Medium average power Attenuation 40 to 21 dB
148	Coaxial Class I Nonscreened Frequency range DC-46 GHz Medium average power Attenuation 40 dB	Coaxial Classes I, IIA and B, III and IV Nonscreened Frequency range (GHz) DC-46, DC-26.5, DC-18, DC-12, DC-8 and DC-2 Medium average power Attenuation 40 to 21 dB
149	Coaxial Class I Screened Frequency range DC-46 GHz High average power Attenuation 40 dB	Coaxial Classes I, IIA and B, III and IV Screened or nonscreened Frequency range (GHz) DC-46, DC-26.5, DC-18, DC-12, DC-8 and DC-2 High average power Attenuation 40 to 21 dB
150	Coaxial Class I Nonscreened Frequency range DC-46 GHz High average power Attenuation 40 dB	Coaxial Classes I, IIA and B, III and IV Nonscreened Frequency range (GHz) DC-46, DC-26.5, DC-18, DC-12, DC-8 and DC-2 High average power Attenuation 40 to 21 dB
151	Coaxial Class IIA Screened Frequency range DC-46 GHz Low average power Attenuation 40 dB	Coaxial Classes IIA and B, III and IV Screened or nonscreened Frequency range (GHz) DC-46, DC-26.5, DC-18, DC-12, DC-8 and DC-2 Low average power Attenuation 40 to 21 dB
152	Coaxial Class IIA Nonscreened Frequency range DC-46 GHz Low average power Attenuation 40 dB	Coaxial Classes IIA and B, III and IV Nonscreened Frequency range (GHz) DC-46, DC-26.5, DC-18, DC-12, DC-8 and DC-2 Low average power Attenuation 40 to 21 dB

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TABLE VIII. Grouping for qualification - Continued.

Group number	Characteristics of qualifying attenuators	Characteristics of attenuators qualified
153	Coaxial Class IIA Screened Frequency range DC-46 GHz Medium average power Attenuation 40 dB	Coaxial Classes IIA and B, III and IV Screened or nonscreened Frequency range (GHz) DC-46, DC-26.5, DC-18, DC-12, DC-8 and DC-2 Medium average power Attenuation 40 to 21 dB
154	Coaxial Class IIA Nonscreened Frequency range DC-46 GHz Medium average power Attenuation 40 dB	Coaxial Classes IIA and B, III and IV Nonscreened Frequency range (GHz) DC-46, DC-26.5, DC-18, DC-12, DC-8 and DC-2 Medium average power Attenuation 40 to 21 dB
155	Coaxial Class IIA Screened Frequency range DC-46 GHz High average power Attenuation 40 dB	Coaxial Classes IIA and B, III and IV Screened or nonscreened Frequency range (GHz) DC-46, DC-26.5, DC-18, DC-12, DC-8 and DC-2 High average power Attenuation 40 to 21 dB
156	Coaxial Class IIA Nonscreened Frequency range DC-46 GHz High average power Attenuation 40 dB	Coaxial Classes IIA and B, III and IV Nonscreened Frequency range (GHz) DC-46, DC-26.5, DC-18, DC-12, DC-8 and DC-2 High average power Attenuation 40 to 21 dB
157	Coaxial Class III Screened Frequency range DC-46 GHz Low average power Attenuation 40 dB	Coaxial Classes III and IV Screened or nonscreened Frequency range (GHz) DC-46, DC-26.5, DC-18, DC-12, DC-8 and DC-2 Low average power Attenuation 40 to 21 dB
158	Coaxial Class III Nonscreened Frequency range DC-46 GHz Low average power Attenuation 40 dB	Coaxial Classes III and IV Nonscreened Frequency range (GHz) DC-46, DC-26.5, DC-18, DC-12, DC-8 and DC-2 Low average power Attenuation 40 to 21 dB

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TABLE VIII. Grouping for qualification - Continued.

Group number	Characteristics of qualifying attenuators	Characteristics of attenuators qualified
159	Coaxial Class III Screened Frequency range DC-46 GHz Medium average power Attenuation 40 dB	Coaxial Classes III and IV Screened or nonscreened Frequency range (GHz) DC-46, DC-26.5, DC-18, DC-12, DC-8 and DC-2 Medium average power Attenuation 40 to 21 dB
160	Coaxial Class III Nonscreened Frequency range DC-46 GHz Medium average power Attenuation 40 dB	Coaxial Classes III and IV Nonscreened Frequency range (GHz) DC-46, DC-26.5, DC-18, DC-12, DC-8 and DC-2 Medium average power Attenuation 40 to 21 dB
161	Coaxial Class III Screened Frequency range DC-46 GHz High average power Attenuation 40 dB	Coaxial Classes III and IV Screened or nonscreened Frequency range (GHz) DC-46, DC-26.5, DC-18, DC-12, DC-8 and DC-2 High average power Attenuation 40 to 21 dB
162	Coaxial Class IV Nonscreened Frequency range DC-46 GHz High average power Attenuation 40 dB	Coaxial Class IV Nonscreened Frequency range (GHz) DC-46, DC-26.5, DC-18, DC-12, DC-8 and DC-2 High average power Attenuation 40 to 21 dB
163	Coaxial Class IV Screened Frequency range DC-46 GHz Low average power Attenuation 40 dB	Coaxial Class IV Screened or nonscreened Frequency range (GHz) DC-46, DC-26.5, DC-18, DC-12, DC-8 and DC-2 Low average power Attenuation 40 to 21 dB
164	Coaxial Class IV Nonscreened Frequency range DC-46 GHz Low average power Attenuation 40 dB	Coaxial Class IV Nonscreened Frequency range (GHz) DC-46, DC-26.5, DC-18, DC-12, DC-8 and DC-2 Low average power Attenuation 40 to 21 dB

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TABLE VIII. Grouping for qualification - Continued.

Group number	Characteristics of qualifying attenuators	Characteristics of attenuators qualified
165	Coaxial Class IV Screened Frequency range DC-46 GHz Medium average power Attenuation 40 dB	Coaxial Class IV Screened or nonscreened Frequency range (GHz) DC-46, DC-26.5, DC-18, DC-12, DC-8 and DC-2 Medium average power Attenuation 40 to 21 dB
166	Coaxial Class IV Nonscreened Frequency range DC-46 GHz Medium average power Attenuation 40 dB	Coaxial Class IV Nonscreened Frequency range (GHz) DC-46, DC-26.5, DC-18, DC-12, DC-8 and DC-2 Medium average power Attenuation 40 to 21 dB
167	Coaxial Class IV Screened Frequency range DC-46 GHz High average power Attenuation 40 dB	Coaxial Class IV Screened or nonscreened Frequency range (GHz) DC-46, DC-26.5, DC-18, DC-12, DC-8 and DC-2 High average power Attenuation 40 to 21 dB
168	Coaxial Class IV Nonscreened Frequency range DC-46 GHz High average power Attenuation 40 dB	Coaxial Class IV Nonscreened Frequency range (GHz) DC-46, DC-26.5, DC-18, DC-12, DC-8 and DC-2 High average power Attenuation 40 to 21 dB
169 thru 174	Same as for groups 145 through 150 respectively with the following exception: Frequency range DC-26.5 GHz	Frequency range (GHz) DC-26.5, DC-18, DC-12, DC-8 and DC-2
175 thru 180	Same as for groups 151 through 156 respectively with the following exception: Frequency range DC-26.5 GHz	Frequency range (GHz) DC-26.5, DC-18, DC-12, DC-8 and DC-2
181 thru 186	Same as for groups 157 through 162 respectively with the following exception: Frequency range DC-26.5 GHz	Frequency range (GHz) DC-26.5, DC-18, DC-12, DC-8 and DC-2

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TABLE VIII. Grouping for qualification - Continued.

Group number	Characteristics of qualifying attenuators	Characteristics of attenuators qualified
187 thru 192	Same as for groups 163 through 168 respectively with the following exception: Frequency range DC-26.5 GHz	Frequency range (GHz) DC-26.5, DC-18, DC-12, DC-8 and DC-2
193 thru 198	Same as for groups 145 through 150 respectively with the following exception: Frequency range DC-18 GHz	Frequency range (GHz) DC-18, DC-12, DC-8 and DC-2
199 thru 204	Same as for groups 151 through 156 respectively with the following exception: Frequency range DC-18 GHz	Frequency range (GHz) DC-18, DC-12, DC-8 and DC-2
205 thru 210	Same as for groups 157 through 163 respectively with the following exception: Frequency range DC-18 GHz	Frequency range (GHz) DC-18, DC-12, DC-8 and DC-2
211 thru 216	Same as for groups 163 through 168 respectively with the following exception: Frequency range DC-18 GHz	Frequency range (GHz) DC-18, DC-12, DC-8 and DC-2
217 thru 222	Same as for groups 145 through 150 respectively with the following exception: Frequency range DC-12 GHz	Frequency range (GHz) DC-12, DC-8 and DC-2.
223 thru 228	Same as for groups 151 through 156 respectively with the following exception: Frequency range DC-12 GHz	Frequency range (GHz) DC-12, DC-8 and DC-2
229 thru 234	Same as for groups 157 through 162 respectively with the following exception: Frequency range DC-12 GHz	Frequency range (GHz) DC-12, DC-8 and DC-2

APPENDIX

TABLE VIII. Grouping for qualification - Continued.

Group number	Characteristics of qualifying attenuators	Characteristics of attenuators qualified
235 thru 240	Same as for groups 163 through 168 respectively with the following exception: Frequency range DC-12 GHz	Frequency range (GHz) DC-12, DC-8 and DC-2
241	Coaxial Class I Screened Frequency range DC-26.5 GHz Low average power Attenuation 60 dB	Coaxial Classes I, IIA and B, III and IV Screened or nonscreened Frequency range (GHz) DC-31, DC-26.5, DC-18, DC-12, DC-8 and DC-2 Low average power Attenuation 60 to 41 dB
242	Coaxial Class I Nonscreened Frequency range DC-26.5 GHz Low average power Attenuation 60 dB	Coaxial Classes I, IIA and B, III and IV Nonscreened Frequency range (GHz) DC-26.5, DC-18, DC-12, DC-8 and DC-2 Low average power Attenuation 60 to 41 dB
243	Coaxial Class I Screened Frequency range DC-26.5 GHz Medium average power Attenuation 60 dB	Coaxial Classes I, IIA and B, III and IV Screened or nonscreened Frequency range (GHz) DC-26.5, DC-18, DC-12, DC-8 and DC-2 Medium average power Attenuation 60 to 41 dB
244	Coaxial Class I Nonscreened Frequency range DC-26.5 GHz Medium average power Attenuation 60 dB	Coaxial Classes I, IIA and B, III and IV Nonscreened Frequency range (GHz) DC-26.5, DC-18, DC-12, DC-8 and DC-2 Medium average power Attenuation 60 to 41 dB
245	Coaxial Class IIA Screened Frequency range DC-26.5 GHz Low average power Attenuation 60 dB	Coaxial Classes IIA and B, III and IV Screened or nonscreened Frequency range (GHz) DC-26.5, DC-18, DC-12, DC-8 and DC-2 Low average power Attenuation 60 to 41 dB
246	Coaxial Class IIA Nonscreened Frequency range DC-26.5 GHz Low average power Attenuation 60 dB	Coaxial Classes IIA and B, III and IV Nonscreened Frequency range (GHz) DC-26.5, DC-18, DC-12, DC-8 and DC-2 Low average power Attenuation 60 to 41 dB

APPENDIX

TABLE VIII. Grouping for qualification - Continued.

Group number	Characteristics of qualifying attenuators	Characteristics of attenuators qualified
247	Coaxial Class IIA Screened Frequency range DC-26.5 GHz Medium average power Attenuation 60 dB	Coaxial Classes IIA and B, III and IV Screened or nonscreened Frequency range (GHz) DC-26.5, DC-18, DC-12, DC-8 and DC-2 Medium average power Attenuation 60 to 41 dB
248	Coaxial Class IIA Nonscreened Frequency range DC-26.5 GHz Medium average power Attenuation 60 dB	Coaxial Classes IIA and B, III and IV Nonscreened Frequency range (GHz) DC-26.5, DC-18, DC-12, DC-8 and DC-2 Medium average power Attenuation 60 to 41 dB
249	Coaxial Class III Screened Frequency range DC-26.5 GHz Low average power Attenuation 60 dB	Coaxial Classes III and IV Screened or nonscreened Frequency range (GHz) DC-26.5, DC-18, DC-12, DC-8 and DC-2 Low average power Attenuation 60 to 41 dB
250	Coaxial Class III Nonscreened Frequency range DC-26.5 GHz Low average power Attenuation 60 dB	Coaxial Classes III and IV Nonscreened Frequency range (GHz) DC-26.5, DC-18, DC-12, DC-8 and DC-2 Low average power Attenuation 60 to 41 dB
251	Coaxial Class III Screened Frequency range DC-26.5 GHz Medium average power Attenuation 60 dB	Coaxial Classes III and IV Screened or nonscreened Frequency range (GHz) DC-26.5, DC-18, DC-12, DC-8 and DC-2 Medium average power Attenuation 60 to 41 dB
252	Coaxial Class III Nonscreened Frequency range DC-26.5 GHz Medium average power Attenuation 60 dB	Coaxial Classes III and IV Nonscreened Frequency range (GHz) DC-26.5, DC-18, DC-12, DC-8 and DC-2 Medium average power Attenuation 60 to 41 dB

APPENDIX

TABLE VIII. Grouping for qualification - Continued.

Group number	Characteristics of qualifying attenuators	Characteristics of attenuators qualified
253	Coaxial Class IV Screened Frequency range DC-26.5 GHz Low average power Attenuation 60 dB	Coaxial Class IV Screened or nonscreened Frequency range (GHz) DC-26.5, DC-18, DC-12, DC-8 and DC-2 Low average power Attenuation 60 to 41 dB
254	Coaxial Class IV Nonscreened Frequency range DC-26.5 GHz Low average power Attenuation 60 dB	Coaxial Class IV Nonscreened Frequency range (GHz) DC-26.5, DC-18, DC-12, DC-8 and DC-2 Low average power Attenuation 60 to 41 dB
255	Coaxial Class IV Screened Frequency range DC-26.5 GHz Medium average power Attenuation 60 dB	Coaxial Class IV Screened or nonscreened Frequency range (GHz) DC-26.5, DC-18, DC-12, DC-8 and DC-2 Medium average power Attenuation 60 to 41 dB
256	Coaxial Class IV Nonscreened Frequency range DC-26.5 GHz Medium average power Attenuation 60 dB	Coaxial Class IV Nonscreened Frequency range (GHz) DC-26.5, DC-18, DC-12, DC-8 and DC-2 Medium average power Attenuation 60 to 41 dB
257 thru 260	Same as for groups 241 through 244 respectively with the following exception: Frequency range DC-18 GHz	Frequency range (GHz) DC-18, DC-12, DC-8 and DC-2
261 thru 264	Same as for groups 245 through 248 respectively with the following exception: Frequency range DC-18 GHz	Frequency range (GHz) DC-18, DC-12, DC-8 and DC-2
265 thru 268	Same as for groups 249 through 252 respectively with the following exception: Frequency range DC-18 GHz	Frequency range (GHz) DC-18, DC-12, DC-8 and DC-2

APPENDIX

TABLE VIII. Grouping for qualification - Continued.

Group number	Characteristics of qualifying attenuators	Characteristics of attenuators qualified
269 thru 272	Same as for groups 253 through 256 respectively with the following exception: Frequency range DC-18 GHz	Frequency range (GHz) DC-18, DC-12, DC-8 and DC-2
273 thru 276	Same as for groups 241 through 244 respectively with the following exception: Frequency range DC-12 GHz	Frequency range (GHz) DC-12, DC-8 and DC-2
277 thru 280	Same as for groups 245 through 248 respectively with the following exception: Frequency range DC-12 GHz	Frequency range (GHz) DC-12, DC-8 and DC-2
281 thru 284	Same as for groups 249 through 252 respectively with the following exception: Frequency range DC-12 GHz	Frequency range (GHz) DC-12, DC-8 and DC-2
285 thru 288	Same as for groups 253 through 256 respectively with the following exception: Frequency range DC-12 GHz	Frequency range (GHz) DC-12, DC-8 and DC-2
	Stripline, terminal or	Lead
289	Class III Screened Frequency range DC-12 GHz Low average power Attenuation 20 dB	Classes III and IV Screened or nonscreened Frequency range (GHz) DC-12, DC-4 and DC-1 Low average power Attenuation 20 to 1 dB
	Stripline, terminal or	Lead
290	Class III Nonscreened Frequency range DC-12 GHz Low average power Attenuation 20 dB	Classes III and IV Nonscreened Frequency range (GHz) DC-12, DC-8, DC-4 and DC-1 Low average power Attenuation 20 to 1 dB

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TABLE VIII. Grouping for qualification - Continued.

Group number	Characteristics of qualifying attenuators	Characteristics of attenuators qualified
291	Stripline, Terminal or Class III Screened Frequency range DC-12 GHz Medium average power Attenuation 20 dB	Lead Classes III and IV Screened or nonscreened Frequency range (GHz) DC-12, DC-8, DC-4 and DC-1 Medium average power Attenuation 20 to 1 dB
292	Stripline, Terminal or Class III Nonscreened Frequency range DC-12 GHz Medium average power Attenuation 20 dB	Lead Classes III and IV Nonscreened Frequency range (GHz) DC-12, DC-8, DC-4 and DC-1 Medium average power Attenuation 20 to 1 dB
293	Stripline, Terminal or Class IV Screened Frequency range DC-12 GHz Low average power Attenuation 20 dB	Lead Class IV Screened or nonscreened Frequency range (GHz) DC-12, DC-8, DC-4 and DC-1 Low average power Attenuation 20 to 1 dB
294	Stripline, Terminal or Class IV Nonscreened Frequency range DC-12 GHz Low average power Attenuation 20 dB	Lead Class IV Nonscreened Frequency range (GHz) DC-12, DC-8, DC-4 and DC-1 Low average power Attenuation 20 to 1 dB
295	Stripline, Terminal or Class IV Screened Frequency range DC-12 GHz Medium average power Attenuation 20 dB	Lead Class IV Screened or nonscreened Frequency range (GHz) DC-12, DC-8, DC-4 and DC-1 Medium average power Attenuation 20 to 1 dB
296	Stripline, Terminal or Class IV Nonscreened Frequency range DC-12 GHz Medium average power Attenuation 20 dB	Lead Class IV Nonscreened Frequency range (GHz) DC-12, DC-8, DC-4 and DC-1 Medium average power Attenuation 20 to 1 dB
297 thru 300	Same as for groups 289 through 292 respectively with the following exception: Frequency range DC-8 GHz	Frequency range (GHz) DC-8, DC-4 and DC-1

APPENDIX

TABLE VIII. Grouping for qualification - Continued.

Group number	Characteristics of qualifying attenuators	Characteristics of attenuators qualified
301 thru 304	Same as for groups 293 through 296 respectively with the following exception: Frequency range DC-8 GHz	Frequency range (GHz) DC-8, DC-4 and DC-1
305 thru 308	Same as for groups 289 through 292 respectively with the following exception: Frequency range DC-4 GHz	Frequency range (GHz) DC-4 and DC-1
309 thru 312	Same as for groups 293 through 296 respectively with the following exception: Frequency range DC-4 GHz	Frequency range (GHz) DC-4 and DC-1
313 thru 316	Same as for groups 289 through 292 respectively with the following exception: Frequency range DC-1 GHz	Frequency range (GHz) DC-1
317 thru 320	Same as for groups 293 through 296 respectively with the following exception: Frequency range DC-1 GHz	Frequency range (GHz) DC-1

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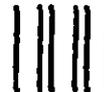
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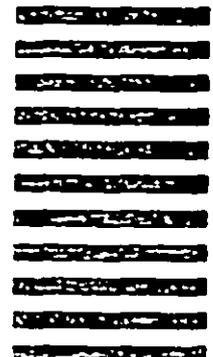


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